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Factors that affect learners' performance in web-based courses: the case of the accounting courses at the Hashemite University

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Factors That Affect Learners' Performance in Web-Based Courses: The Case of the Accounting Courses at the Hashemite University

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Glossary

The following definitions were used in the current study.

Adjusted Goodness of Index (AGFI): is an index takes into account the model complexity. It adjusts goodness of fit index (GFI) (see definition of GFI) by a ratio of the degrees of freedom used in a model to the total degrees of freedom available (Hair et al., 2010)

Analysis of Moment Structure (AMOS) is among the first SEM programmes to simplify the interface. AMOS 18 was used in the current research. Another specialized software package used is LISREL (Linear Structural Relations).

Analysis of Variance (ANOVA): "a statistical procedure that uses the F-ratio to test the overall fit of a linear model"(Field, 2009:781).

Arbitrary scaling: is a scaling technique "developed on *ad hoc* basis and are designed largely through the researcher's own subjective selection of items" (Kothari, 2004:83)

Asynchronous: Communication in which interaction between parties does not take simultaneously (Glossary, n.d)

Average Variance Extracted (AVE): is a statistical technique that measures the amount of variance captured by the construct. This value equals the average of the squared factor loadings

Bartlett's Test of Sphericity: a test examines whether a variance- covariance matrix is proportional to an identity matrix. (Field, 2009).

Blackboard is a tool that allows faculty to add resources for students to access online. PowerPoint, Captivate, video, audio, animation, and other applications are created outside of Blackboard and added into Blackboard courses for students to enhance teaching and learning efforts (Blackboard support, n.d).

Blended learning: Traditional face-to face courses supported by web-materials through a course management system (Blackboard) to foster the learning outcomes.

Change in student performance: the difference between the actual performance (overall grade) at the end of the semester and the predicted performance based on the students' grades in the pre-requisite course (Accounting II).

Chi-square (χ^2): "is the difference in the observed and estimated covariance matrices" (Hair et al., 2010:665).

Chi-Square/df: is the ratio of chi-square (χ^2) and its degree of freedom.

Collaborative learning pedagogy: This pedagogy assumes that knowledge is created through interaction and sharing experiences between the population members (Mitnik et al., 2009).

Comparative Fit Index (CFI): an improved version of the Normed Fit Index (NFI) (see definition of NFI).

Computer Experience: "the number of web-based courses a student has taken, perception of computer skills, and knowledge of electronic technology" Thurmond (2003:79).

Confirmatory Factor Analysis (CFA): "is a way of testing how well measured variables represent a smaller number of constructs (Hair et al., 2010:693)

Construct reliability: is a measure of reliability and internal consistency of the measured variables representing a latent variable.

Content analysis: is "a research method that uses a set of procedures to make valid inferences from a text" (Weber, 1990:9).

Content validity: is "the extent to which a measuring instrument provides adequate coverage of the investigative questions guiding the study" (Cooper & Schindler, 2008:290).

Convergent validity: "measures the degree to which the indicators of a latent construct measure the same construct" (Arnold, 2006:197)

Critical ratio: is "a value of a test statistic (*t* test, *f* test) that denotes a specific significance level (Hair et al., 2010:441).

Cumulative scaling: a scaling technique that "consists of series of statements to which a respondent expresses his agreement or disagreement. The special feature of this type of scale is that statements in it from a cumulative series" (Kothari, 2004:87)

Deductive approach: "a study in which a conceptual and theoretical structure is developed which is then tested by empirical observation; thus particular instances are deducted from general influences" Hussey and Hussey (1997:19)

Degrees of freedom (df): "represents the amount of mathematical information available to estimate model parameters" (Hair et al., 2010:665).

Differential scaling: is a scaling technique " under this approach the selection of items is made by a panel of judges who evaluate the items in terms of whether they are relevant to the topic area and unambiguous in implication" (Kothari, 2004:83)

Discriminant validity "measures the degree to which two or more latent constructs measure different constructs" (Arnold, 2006:197).

E-Learning: is "the use of new multimedia technologies and the internet to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration". European Commission (EC) (2001: 2)

EduWave system: is " a learning management, instructional management, schools management, and content management system that provides a single, integrated resource for e-learning" (Al-Adhaileh, 2010: 328).

Eigenvalue: is "column sum of squared loadings for a factor; also referred to as the latent root. It represents the amount of variance accounted for by a factor" (Hair et al., 2010:92).

Endogenous variable: "is dependent variable generated within a model and therefore, a variable whose value is changed (determined) by one of the functional relationships in that model" (Business Dictionary.com, n.d.)

Enquiry based learning: In this pedagogy learners are responsible for exploring an idea or a question to understand a concept individually or part of a group (Kahn and O'Rouke, 2005).

Environmental variables: "Environment encompasses everything that happens to a student during the course of an educational program that might conceivably influence the outcome under consideration" Astin (1993:81).

Exogenous variable: "is independent variable that affect a model without being affected by it" (Business Dictionary.com, n.d.).

Exploratory Factor Analysis (EFA): is a way of defining possible relationships between measured variables in only the most general form and then allowing the multivariate technique to estimate relationship(s) (Hair et al., 2010)

Factor analysis: "is a multivariate technique for identifying whether the correlations between a set of observed variables stem from their relationship to one or more latent variables in the data, each of which takes the form of a linear model" (Field, 2009: 786).

Factor loadings: "are the correlation of each variable and the factor. Loadings indicate the degree of correspondence between the variable and the factor, with higher loadings making the variable representative of the factor" (Hair et al., 2010:112)

Factor rotation: is the **"**Process of manipulation or adjusting the factor axes to achieve a simpler and pragmatically more meaningful factor solution" (Hair et al., 2010:92).

Factor scaling: a scaling technique "developed through factor analysis or on the basis of intercorrelations of items which indicate that a common factor accounts for the relationships between items" (Kothari, 2004:89).

Goodness of Fit Index (GFI): "An early attempt to produce a fit statistic that was less sensitive to sample size" (Hair et al., 2010: 667).

Hierarchical regression: is a method of multiple regression in which the order in which variables are entered into the regression model is determined by the researcher based on previous research: variables already known to be predictors are entered first, and new variables are entered subsequently (Field, 2009)

Inductive approach: "a study in which theory is developed from the observation of empirical reality; thus general inferences are induced from particular instances (Hussey & Hussey, 1997:13)

Input variables: are "those personal qualities the student brings initially to the educational program".(Astin, 1993:18)

Interpretational confounding: Measurement estimates for one construct are significantly affected by relationships other than those among the specific measures (Hair et al., 2010: 690).

Item reliability: refers to how much the construct explains the variance in an item. It can be measured by squaring the factor loading or can be obtained directly from AMOS.

Kaiser-Meyer-Olkin (KMO): a measure of sampling adequacy it can be calculated for individual and multiple variables and represents the ratio of the squared correlation between variables to the squared partial correlation between variables (Field, 2009).

Learning Management System: is a database software application that can track users, provide a multitude of reports, handle administrative functions through an interface or dashboard, enrol students, document online tasks, and manage online classroom events, content and training programs. (eHow, 2011)

Likert scaling: is a scaling technique “ developed by utilizing the item analysis approach wherein a particular item is evaluated on the basis of how well it discriminate between those persons whose total score is high and those whose score is low” (Kothari, 2004: 84)

Mixed methods research: “in which the researcher decides to blend or combine both quantitative and qualitative methods” (Plano Clark et al., 2008:364).

Modification indices: are indices to determine to what extent the sample data supports the theoretical model.

Motivation: the students’ desire to perform and learn better and to earn knowledge

Normed Fit Index (NFI): is an index that assesses how well a specified model fits relative null model (Hair et al., 2010).

Passive learning: In this type of learning “students are assumed to enter the course with minds like empty vessels or sponges to be filled with knowledge” (McManus, 2001:424).

Path analysis: is an approach that employs simple bivariate correlation to estimate relationships in a structural equation modelling (SEM). It seeks to determine the strength of the path shown in path diagrams (Hair et al., 2010)

Performance: the final grade students obtained at the end of the web-based course.

Principal Component Analysis (PCA): “a multivariate technique for identifying the linear component of a set of variables” (Field, 2009:792)

Problem based learning: In this pedagogy students are considered the centre of the educational process by focusing on what is learned by students rather than what is taught by teachers.

Students are encouraged to investigate scientific, realistic, and ill-structured problems in order to learn by finding a proper solution (Barett, 2005).

Qualitative data analysis: explores themes, patterns, stories, narrative structure and language within research texts (interview transcripts, field notes, documents, visual data, etc.) in order to interpret meanings and to generate rich depictions of research settings.

Quantitative data analysis: "is used to answer questions about relationships among measurable variables" (Cottrell & McKenzie, 2005:3)

R Squared (R^2): Indicates the percentage of total variation of the dependent variable explained by the regression model consisting of the independent variables.

Reliability: "The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable" Joppe (2000:1).

Research designs "are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis" (Creswell, 2009:3)

Research methods "involve the forms of data collection, analysis, and interpretation that researchers propose for their studies" (Creswell, 2009:15)

Root Mean Square Error of Approximation (RMSEA): represent how well a model fits a population not just a sample used for estimation (Hair et al., 2010:667).

Self efficacy: the students' evaluation of their confidence, ability and comfort in using the Blackboard system.

Semi-structured interview: is a type of interviews in which "the interviewer makes reference to an outline of the topics to be covered during the course of the conversation. The order in which the topics are dealt with and the wording of the questions are left to the interviewer's discretion. Within each topic, the interviewer is free to conduct the conversation as he thinks fit, to ask the questions he deems appropriate in the words he considers best, to give explanations and ask for clarification if the answer is not clear, to prompt the respondent to elucidate further if necessary and to establish his own style of conversation." Corbetta (2003:270).

Strategies of inquiry: "types of qualitative, quantitative, and mixed methods designs or models that provide specific direction for procedures in a research design" Creswell (2009:11).

Structural Equation Modelling (SEM): is as a "multivariate technique combining aspects of factor analysis and multiple regression that enables the researcher to simultaneously examine a series of interrelated dependence relationships among the measured variables and latent constructs (variables) as well as between several latent constructs" (Hair et al., 2010: 634)

Structured interviews:"are interviews in which all respondents are asked the same questions with the same wording and in the same sequence" (Corbetta, 2003:269).

Student attitudes toward web-based learning : the students' evaluations of enjoyment in the web-based courses and their evaluations of the attractiveness of this type of learning

Student participation in the online learning environment: the frequency with which the course web-site was accessed and messages were posted to the discussion board as well as time spent working with course content.

Student perceptions of the interaction of instructors: student perceptions of their instructors' presence and student perceptions of their timely feedback.

Student perceptions of the use of technology: student perceptions of the availability and reliability of the technology and Internet and the ability of technology to promote the effective use of time.

Synchronous: Communication in which interaction between participants is simultaneously. (Glossary, n.d.)

Unstructured interviews: in this type of interviews the interviewers have complete freedom in terms of the wording they use and the way they explain questions to respondents (Kumar, 2005).

Validity: "refers to the issue of whether or not an indicator (or set of indictors) that is devised to gauge a concept really measures the concept" (Bryman & Bell, 2007,:165).

Abstract

The current research aimed to identify the main factors that affect students' performance in web-based courses in a university in Jordan. In order to achieve this goal the current research design employed a mixed methods approach in that it embraced an exploratory approach in the first phase and moved to an explanatory approach in the second phase. The exploratory phase consisted of conducting four group interviews with students enrolled in web-based courses at the Accounting Department at the Faculty of Economics and Administrative Sciences and one group interview with Accounting instructors. While the explanatory phase employed a quantitative method (questionnaire) to examine the study's proposed models.

Astin's Input-Environment-Outcomes (I-E-O) guided the current study's framework to investigate factors that may influence student performance in web-based courses. Input variables were computer experience, student attitude toward web-based learning, self efficacy, motivation, and prior performance. Environmental variables included student perceptions of the interaction of instructors; use of technology; and participation in the online learning environment.

Data was gathered from a survey of 461 undergraduate students enrolled in two web-based accounting courses at the Hashemite University in Jordan.

The most important contribution of the current study is that it conducted the analysis in the context of a developing country (Jordan). Therefore, this study will fill the gap in the literature regarding the effect of using web-based learning on student performance in Jordan and will provide the basis for further research in developing countries on student performance in web-based learning. The study also adds to collective knowledge of the effects of e-learning by adding a case study set in a new context to the existing range of studies. In doing so it broadens the scope of research on e-learning effectiveness.

The results indicated that the study's model was valid and fit the data and it was reasonable to test the model in terms of path significance. The study explained 73% of the variance in student performance, but only 3% of the variation in change in performance was explained.

The findings of the current research revealed that input variables (particularly prior performance and student attitudes toward web-based learning) were the most significant, direct input factors affecting student performance. In addition, it was found that environmental variables (particularly student participation in web-based courses and student perceptions of the interaction of their instructors) also had a significant direct effect on student performance. These findings underline that it is not the technology used in the learning process that makes a difference in student performance in web-based learning, but it is instructor interactivity and the pedagogy used in teaching the Accounting courses at the Hashemite University. This is not to say that technology is unimportant or that it can be ignored. However, the functionality, usability and reliability of e-learning technology have rapidly improved to the point where questions of how it is deployed and exploited become more important than what it is capable of doing.

Chapter One

Introduction

1.1 Introduction

The rapid development of technology has affected our lives dramatically. One of these developments is the use of the Internet, which has increased sharply over the last nine years. According to Internet World Stats (2010), 25.6% of the world's population uses the Internet, with a growth of 380.3% from 2000 to 2009. North America takes the lead with 74.2% of its population, but Africa takes the last rank with 6.8% of its population. In the Middle East, 28.3% of the population uses the Internet, with a growth of 1648% from 2000 to 2009, the highest overall growth rate in the world. Jordan participated in this growth, going from 2.4% of its population in 2000 to 18.2% in 2009. Educators were among the first end users of this great invention. This might be due to the high efficiency and low cost of using the World Wide Web in education (Muse, 2003).

The increasing number of students in Jordan's public universities (from 30,000 students in 1985 to more than 190,000 in 2008) caused a major cost problem for these universities. E-enabled delivery is widely seen as one possible means of resolving these tensions through the development of web-based courses (Alkhadash & Abuloum, 2005). The use of web-based courses is currently popular in every field of education, especially in business schools (Friday et al., 2006). Several factors led to the popularity of web-based courses among students and universities, such as its flexibility in terms of time and place and the availability of a better participation environment in comparison with traditional learning (Hammoud et al., 2008).

Increasing technology developments in the field of accounting and rapid changes in the accounting context led to the need for better methods of delivering accounting material to students (Albrecht & Sack, 2000). This led to an increased interest in using the Internet in education generally and in accounting in particular through the adoption of virtual learning to support traditional learning (De Lange et al., 2003; Marriott, 2004).

Internet and computer-based learning is often called “e-learning” (Orhan, 2007). Sun et al. (2008:1183) defined e-learning as “the use of telecommunication technology to deliver information for education and training”. In other words, e-learning can be defined as using computers and the internet in the learning process (Clark and Mayer, 2003). The European Commission (2001: 2) defined e-learning as “the use of new multimedia technologies and the internet to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration”.

An e-learning environment consists of functions that make this type of learning an interactive learning system. These useful functions attracted both educators and learners as they support the learning process and improve its quality, for example e-mail, discussion forums, assignments, and quizzes. Accordingly, e-learning provides learners with more effective feedback, meaningful learning, and better communication (Bonk et al., 2003).

Nowadays, many universities and schools are investing more in web-based management tools such as WebCT™ and Blackboard™. As a result of this interest, the use of these packages by accounting educators in their classrooms is increasing rapidly (Watson et al., 2007). This has formed an incentive for accounting educators to design an effective virtual learning environment using these packages to enhance student outcome (De Lange et al., 2003).

Most Jordanian universities, including the Hashemite University, are currently adopting e-learning education due to the increased number of students and the reduction in government funding to these universities (Alkhadash & Abuloum, 2005). Accordingly, it is important to understand how a new form of learning can affect the learning process, especially when it is used by different types of learners. Furthermore, it is important to identify the factors that influence the success of learners in the new form of learning (Shih & Gamon, 2001). Hence, this research was conducted to provide some assurance regarding the effective implementation of online instruction through a deep analysis of this environment. This research aimed to highlight and consider the important factors that might affect student performance in web-based learning in Jordan.

1.2 Advantages and disadvantages of e-learning

One of the most important advantages of e-learning is flexibility in terms of time and place. That is, it provides freedom as to the time and place the course material is accessed and as to the time and place others are interacted with through asynchronous and synchronous learning (Sun et al., 2008). Several studies have discussed the advantages of e-learning (Rosenberg, 2001; Capper, 2001; Bouhnik & Marcus, 2006; Liaw et al., 2007). For example, Bouhnik and Marcus (2006: 300) highlighted four major advantages of e-learning:

1. Flexibility of material and time
2. Accessibility to material
3. Visibility of multimedia
4. Availability of the data

Capper (2001: 8) also argued that e-learning provides the following benefits:

1. Any time: There is no specific period to meet others as in conventional courses.
2. Any place: There are no face-to-face meetings; participants can be anywhere: overseas, at home, or at work.
3. Asynchronous interaction: This enhances the interaction process by making it more succinct, and any conversations are more thoughtful.
4. Group collaboration: Interaction in the e-learning environment increases the chance of teamwork through discussion and conversation.
5. New educational approaches: Using e-learning, any learning methods or strategies become economically feasible.

Rosenberg (2001) added further benefits, such as the fact that e-learning reduces costs, increases valuable services to end users and forms worldwide societies.

Despite the advantages of e-learning, some studies have indicated that high percentages of students drop their online courses (Dutton et al., 2002), which has caused some researchers to become alarmed and believe that there are problems with e-learning . This issue can be clarified by surveying students regarding their satisfaction or dissatisfaction with e-learning. For example, Bouhnik and Marcus (2006:300) conducted a survey of students and stated the following disadvantages:

• There is a lack of a firm framework—this tends to encourage laziness.

• A high level of self-discipline is required.

• There is an absence of a "learning atmosphere."

• The distance-learning format minimizes the level of contact, as well as the level of discussion, between the students.

• The learning process is less efficient, when compared to a face-to-face learning format, and requires the students to dedicate more time to learning the subject matter.

• There is a lack of interpersonal, direct (non-mediated) interaction.

• In answering his or her students' questions, the teacher's ability to widen the scope of his or her answer is limited.

E-learning was mainly criticised for the absence of human interaction (Laurillard, 2003). Accordingly the quality of e-learning and its outcomes have been affected negatively (Lim and Morris, 2009).

1.3 Blended learning

Problems related to the pure online learning and traditional learning systems led to the idea of combining the two learning environments to overcome the disadvantages of each learning environment (Delialiogh and Yildirim, 2007). Therefore educators made more efforts to combine the benefits provided by the traditional learning (for example social interaction between students and instructors) with those benefits provided by online learning (for example flexibility in terms of time and place, and efficiency) (Delialiogh and Yildirim, 2007; Orhan, 2007; Lim and Morris, 2009). Combining these two main features of traditional learning and e-learning might improve the quality of the learning process (Orhan, 2007). This merger of the two learning methods led to what is called hybrid or blended learning (Youn, 2002; Osguthorpe and Graham, 2003; Orhan, 2007). In other words blended learning combines the strengths of conventional learning and online learning.

Applying blended learning achieved several advantages such as increasing the social interaction between learners, improving instructors' feedback and presence in the learning process, improving access to knowledge (Osguthorpe and Graham, 2003), increasing learners' ability in managing their time, and enhancing the learner control over the flow of instruction and speed of learning (Chung and Davis, 1995). Therefore, the adoption of blended learning is increasing significantly and steadily in the education process due to its essential contribution to the learning process in present and the belief of its importance in the near future (So & Bonk, 2010).

The majority of previous studies defined the blended learning as the process of mixing traditional interactive activities of the classroom instruction with technology used in the learning process (Lim and Morris, 2009). In the current study blended learning, as used at the Hashemite University, is defined as traditional face-to-face courses supported by web-materials through a course management system (Blacboard) to foster the learning outcomes.

1.4 E-learning in Jordan

As seen in Figure 1.1, Jordan is located in the Central Middle East.

Figure 1.1: Map of Jordan
(Source: Wikipedia, the free encyclopedia, http://en.wikipedia.org/wiki/File:LocationJordan.svg)

One third of the population (more than 5 million people) is involved in the education system in Jordan, and almost three fourths of this population is under 30 (Al- Adhaileh, 2010).

Therefore, the Jordanian government has been giving education a great deal of attention. The educational process grew rapidly when HM King Abdullah II took the lead in early 2001. HM's vision was to make Jordan a technology hub in the region (Speech reported in ELCU, 2002) and to make Jordan an e-learning model in the region (Speech reported in WEF, 2003). Since that time, the use of the latest technology and networks has been accelerating rapidly in Jordan's public and private universities and schools.

Currently, e-learning is used in the education systems of the majority of the world's countries. In the Middle East and Arab countries, the Internet has spread rapidly, especially in Saudi Arabia, Kuwait, UAE, Jordan and Egypt (Market Wire, 2007). Therefore, despite challenges, e-learning initiatives have been undertaken in the Arab world (Abouchedid, 2004). The rapid growth in the use of the latest technologies, computers and networks in Jordan's public and private universities has led to the acknowledgement of the probable important influence of e-learning on the learning outcomes of students (Al-Adhaileh, 2010). E-learning in Jordan effectively started in 2003 when King Abdullah II launched the first e-learning forum as a part of the World Economic Forum (WEF) initiatives, this is called the Jordan Education Initiative (JEI). This initiative aims to improve education in Jordan through the effective use of information and communication technology. King Abdullah II stressed the integration of technology and education, saying, "This initiative comes in the context of our efforts to reform our entire educational process." He also added, "By empowering our youth through this education initiative, Jordan and its World Economic Forum partners can create a dynamic and practical model of public-private partnership in the area of ICT that can ignite the engines of growth for future generations in Jordan and the region" (Speech reported in WEF, 2003). Since that time, the Jordanian government has been investing heavily in e-learning at schools and universities. It has also adopted a five-year e-learning strategy to build completely wired schools with high specifications, distribute around 100,000 computers overall to classrooms in Jordan, connect schools to the internet using the best and latest connection techniques (e.g. broadband), and train teachers and administrators across the kingdom in IT skills.(The Jordan times. 29th September 2003).

Therefore, in order to achieve HM's vision, in 2003, the Ministry of Education installed the EduWave system[1] at a main data centre to provide services to more than 1.2 million students in Jordan. This step made Jordan the first Arab country to make serious developments in adopting e-learning in education (Al-Adhaileh, 2010).

According to the statistics of the (Jordan) Ministry of Education and the Ministry of Higher Education (2008), there are more than 1.5 million students distributed over more than 5,000 public and private schools and more than 200,000 students distributed over 22 public and private universities. This huge number of students in Jordan led to the expectation that the education sector would be the biggest beneficiary of technology in Jordan through applying e-learning. Accordingly, the Ministry of Higher Education has started to adopt e-learning in the educational system, but its policy started by accrediting blended learning only, not distance learning (Al-Adhaileh, 2010). In 2008, the Ministry of Higher Education announced rules and regulations regarding blended learning. Among these regulations is an accreditation condition which stated that 60% should be traditional and 40% synchronous and asynchronous learning through technology (www.Mohe.gove.jo). This rule was adopted as the first step towards accrediting distance learning in order to study the regulations and rules needed to this type of

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[1] EduWave system is " a learning management, instructional management, schools management, and content management system that provides a single, integrated resource for e-learning" (Al-Adhaileh, 2010: 328)

learning (Al-Adhaileh, 2010). These new regulations and rules encouraged Jordan's universities to update their own regulations to adopt e-learning in their educational systems.

1.5 The Hashemite University (HU)

The increasing need for e-learning in Jordan, especially in higher education, provides Jordanian universities a major incentive to adopt this type of learning. The Hashemite University led the public universities in integrating web-based learning into its courses and was the first public university accredited for online teaching (Al-Khadash & Abuloum, 2005). The Hashemite University (HU) was established in June of 1991, and the teaching process effectively started in September of 1995. In 2003, the Hashemite University started to take several steps toward employing technology in the teaching and learning processes. Firstly, the learning management system, Blackboard, was implemented as a first step toward achieving its vision of supporting its teaching-learning activities using technology. Then, a more advanced step was taken when the e-learning environment was enriched with modern technologies, such as an online assessment tool, desktop content authoring tool, asynchronous content capture tool and online synchronous delivery platform.

The HU e-learning initiative (HU, 2011) aims to achieve a number of objectives and goals, including:

- Assuring e-learning quality
- Generating innovative ideas for improving the learning and teaching processes
- Setting up standards of excellence for e-learning
- Promoting and encouraging e-learning in universities and schools
- Sharing e-learning resources and networks at the domestic and regional levels

- Getting feedback from e-learners to provide policymakers with new ideas, recommendations and strategies

The learning management system used to deliver the web-based material at the Hashemite University provides many benefits and services to the students, such as the following:

- Asynchronous (e-mail, bulletins, and discussion boards) and synchronous (chat) tools.
- Web-based materials: PowerPoint slides, collaborative practice materials, lecture notes, external links for independent learning, external problems and cases, previous exams.
- Online quizzes, exams with results.
- Announcement page to keep students up to date on events and information.

The university provides blended e-learning; that is, besides the electronic interaction, students must attend face-to-face lectures three hours per week to discuss the course material and interact face-to-face. Moreover, students must submit their weekly assignments using the digital drop box feature, as this encourages students to keep in touch with their web-based course. In addition, active student participation in the discussion board is required.

In order to cope with this huge step in learning, the HU has developed a reliable computer network that provides broadband connectivity. Moreover, the university has approximately 3,000 PCs distributed across the university, and it has also provided its students with almost 2,000 laptop computers at a very low price (Al-Adhaileh, 2010).

1.6 Accounting pedagogy at the Hashemite University

Historically, accounting pedagogy has been criticized for using the passive learning[2] to teach accounting subjects. Because this type of learning did not add value to students and was irrelevant to practice that could not produce qualified accountants (Guyette, 2007). Therefore, more than one accounting group have called for reforming accounting education by increasing its relevance to the practice (AECC[3],1990; AICPA[4], 1998). Accordingly, and in order to bridge the gap between the academic curriculum and the professional organization, accounting pedagogy started to move towards concentrating on a pedagogy that improves student skills in analytical and critical thinking, and problem solving (Albrecht, 2002; Lin et al., 2005; Guyette, 2007). This effective pedagogy would make accounting students better qualified and prepared to cope with the rapid changes in economy (Lin et al., 2005).

Since its establishment the Hashemite University has encouraged and promoted innovative ideas for improving the learning and teaching process. Accordingly, the Hashemite University started to use technology in its educational system by adopting blended learning and providing an excellent infrastructure and environment (Al-Adhaileh, 2010). The Accounting Department at the Hashemite University is considered as the foremost department in applying web-based learning. The availability of a learning management system (Blackboard) enabled this department to apply the collaborative learning pedagogy[5]. This is achieved by encouraging students to interact and discuss ideas and thoughts together through the discussion board and face-to-face meetings. Also, students are encouraged to work together in order to understand and

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[2] In this type of learning "students are assumed to enter the course with minds like empty vessels or sponges to be filled with knowledge" (McManus, 2001:424).

[3] Accounting Education Change Commission (AECC).
[4] American Institute of Certified Public Accountants (AICPA)
[5] This pedagogy assumes that knowledge is created through interaction and sharing experiences between the population members (Mitnik et al., 2009)

solve problems related to their subjects but not related to the practice. However, the accounting pedagogy applied in Jordan is still behind the recent pedagogy that concentrates on improving learner skills in analytical and critical thinking, and solving problems related to the practical environment in order to make students more prepared and qualified in their professional life.

1.7 Theoretical framework

The effect of the learning environment on student outcomes is one of the most important relationships that different theories and models have tried to investigate and explain (Stage & Dannells, 2000). Among these models is the I-E-O model developed by Astin (1993). The main reason for the development of this model was to control for student characteristics (input differences) so that the relationship between other variables (environment) and student outcome could be investigated accurately, which provides more precise information about the influence of different factors on student outcome. As a theoretical basis, the I-E-O model has been used widely in previous studies to investigate the effect of different variables on the outcomes of different students in traditional learning and e-learning (Astin, 1968; Knight, 1994; Campbell & Blackey, 1996; Astin & Sax, 1998; House, 1999; Thurmond et al., 2002; Thurmond, 2003).

Three main models have investigated the influence of different factors on different student outcomes. These are Tinto's (1975), Pascarella's (1985) and Astin's I-E-O models (1993). Tinto's model mainly aimed to investigate the factors that influence student attrition in the US. This model investigated different factors: pre-entry attributes, goals and commitment, instructional experience and the impact of instructional experience on goals and commitment (Heywood, 2000). In his causal model, Pascarella examined five independent variables: student background, pre-college traits, institutional structure and organizational characteristics, interaction with socializing agents and quality of student efforts. The third , Astin's (1993) I-E-O model, questioned whether differences in students' personal characteristics (input-variables) have a major influence on their outcome or whether this is caused by other variables. This model also provided a good base for an investigation of the effect of learners' background traits and collegiate experience on their performance (Strayhorn, 2008). Table 1.1 summarizes these three models.

It has been argued that the I-E-O model is easier to understand and operationalize in research than other models, and its explanation of the variance in the outcomes of learners is strongly backed by empirical evidence (Strayhorn, 2008). In addition, it has been argued that the I-E-O model provides the best approach to investigate how environmental variables mediate input and outcome variables (Astin, 1993; Zheng et al., 2002).

Model	Major constructs
Tinto (1975)	pre-entry attributes, goals and commitment, instructional experience and the impact of instructional experience on goals and commitment
Pascarella (1985)	student background, precollege traits, institutional structure and organizational characteristics, interaction with socializing agents and quality of student efforts
Astin (1993)	personal characteristics (input-variables), other variables (environment)

Table 1.1: Models examining factors that affect student outcomes

1.8 Research aims and objectives

The main reason for conducting the current study was to explore why some students perform better than other students in web-based courses. The increasing number of students enrolled in the universities provided the main incentive for the Ministry of Higher Education in Jordan to start adopting e-learning in its educational system. Thus, knowledge regarding factors that affect student performance in web-based learning is needed, as this type of learning is new to some universities in Jordan. Therefore, information about the main factors that affect students in web-based learning should be provided to the policy and decision makers at the universities in order to concentrate on these factors to improve student performance.

The main aim of the current research was to investigate and identify the main factors that affect student performance in the web-based courses in Jordan.

Accordingly, this research attempted to add to the body of knowledge in the area of e-learning and extend the knowledge of factors that affect student performance in web-based learning. The current research had the following objectives

1- To gain a better understanding of the key terms or issues to be sure that the most important factors that may explain student performance were incorporated in the proposed models.
2- To provide some implications and recommendations to the educators at the Hashemite University in Jordan that may help in improving student performance and teaching practices in web-based accounting courses.
3- To provide some implication and recommendations to the policy makers at the Hashemite university about the appropriateness of applying the web-based learning in Accounting, and how to improve the web-based learning environment.
4- To determine the appropriateness and usefulness of applying the I-E-O model to student performance in web-based courses.

5- To determine the appropriateness of applying the I-E-O model in developing countries in general and in Jordan particularly, rather than developed countries as did the previous studies which utilized the I-E-O model.

6- To control for student characteristics (inputs) while investigating the effect of student interaction (environment) in web-based courses on student performance and change in performance. As it is considered as the best approach to investigate how environmental variables mediate input and outcome variables (Astin, 1993; Zheng et al., 2002).

1.9 Research questions

The research design of the current study embraced an exploratory approach in the first phase by asking a broad question (i.e.,What factors may affect student performance in web-based courses?). This research then moved to an explanatory approach in the second phase by asking very specific questions related to student perceptions of the interaction activities in web-based learning (i.e., Do student perceptions of the interaction of instructors in web-based courses affect their performance? Do student perceptions of the use of technology affect their performance? Does student participation in the online learning environment affect their performance?).

1.10 Research methodology

The current research employed mixed methods and used the I-E-O model to guide its framework. This research consisted of two phases. Phase one was an exploratory phase aimed at exploring the main factors that might affect student performance in web-based courses. Group interviews with students and instructors at the Hashemite University were used to gather information about these factors. The main categories of the group interviews were based on reviewing the literature and the I-E-O model. The second phase involved an explanatory approach. In this phase, two models were proposed based on the results of the first phase. Using mixed methodologies helps to develop a better understanding of the problems, overcome the weaknesses of each method (qualitative and quantitative) and obtain better conclusions (Plano Clark et al., 2008). As argued by Astin (1993), without controlling for student characteristics (input) at the beginning of the learning experience, the supposed causal inferences of the relationship between the practice (environment) and outcome of education can be compromised. The current study followed that line of reasoning by controlling for student characteristics (input) while investigating the impact of student interaction in web-based learning (environment) on student performance. The majority of studies that have used the I-E-O model to investigate student performance have relied on survey methodology. Accordingly, the current study applied survey methodology in the second phase in order to maintain continuity and comparability with previous studies.

The study's survey was used to test the study's hypotheses regarding the structure of the proposed models. To analyse the data, the following statistical techniques were employed:

1. Exploratory Factor Analysis (EFA) was used as the first step in determining the latent factors in the questionnaires.
2. Confirmatory Factor Analysis (CFA) was performed on the hypothesized measurement models.
3. Hierarchical regression analysis using Structural Equation Modelling (SEM) was performed on the structural models to evaluate the extent to which student characteristics (inputs) and student perceptions of the interaction in web-based courses (environment) affected student performance and change in performance.

4. SEM was used to revise and examine the proposed structure of the two models. Then, the path values from conducting SEM were used to test the study hypotheses
5. Analyses of variance (ANOVA) was used to determine the effect of certain demographic (gender, ownership of computer and the availability of an Internet connection at home) differences on the factors of the study.

1.11 Significance of the research

This study aimed to identify the main factors that might affect student performance in web-based learning. Knowledge about these factors will help instructors and university administration determine which factors should be considered when designing any web-based course. They will also be able to improve student performance in this type of learning.

The current study proposed two models. The first model used student performance as the independent variable, while the second one used the change in student performance. This makes this study different from other studies that used only student performance (in absolute terms) as the dependent variable. The use of two models can provide universities more precise data to consider when attempting to improve student performance. Thus, the current research may contribute to a better understanding of factors that may affect student performance in web-based learning.

This study contributes to the body of knowledge by applying the I-E-O model to investigate factors not previously integrated into one framework to test their relationship with learner performance. In addition, this study was conducted in the context of a developing country (Jordan), as there are not enough studies conducted in developing countries about e-learning since it has only recently been applied in these countries. I-E-O is a well-developed model used widely in traditional learning but not in the e-learning context to investigate the outcomes of different students. The current study aimed to yield significant insights from both directions: new context and application of an existing model in new domain.

1.12 Organization of the thesis

This thesis is organized into seven chapters. Chapter One is an introduction. Chapter Two provides an overview of the literature that discusses the main models that have investigated the impact of different factors on student outcomes. Chapter Two also discusses the empirical studies that used the I-E-O model in general and in the e-learning context and provides a summary of the main results of the previous studies. In addition, Chapter Two also discusses the main studies that investigated e-learning in accounting, which is the main concern of the current study. Chapter Three describes the study's methodology. This chapter discusses the research philosophy, research approach, research strategy, study methods and research design. Chapter Four discusses the group interviews with students and instructors in the Accounting Department at the Hashemite University. As a result of analysing the qualitative data, the main factors that affect student performance have been identified. Chapter Five summarizes the development of the study's proposed models and describes the research questions and hypotheses. Chapter Six discusses the results of the quantitative analysis, and the techniques used to analyse the quantitative data: exploratory factor analysis (EFA), confirmatory factor analysis (CFA), hierarchical regression analysis using structural equation modelling (SEM), and SEM. Finally, Chapter Seven summarizes the study's results, discusses the implications and limitations of the research and provides recommendations for educators and future research.

Chapter Two

Literature review

This chapter is organized as follows:

1. Firstly, the literature on web-based courses is introduced.
2. Secondly, theories and models related to the field of student outcomes with a concentration on Astin's (1993) model and empirical studies that have tested this model in general and in e-learning are reviewed.
3. Thirdly, a literature review regarding the two main variables that affect student performance in web-based courses (i.e., input and environment) is provided.
4. Finally, a discussion of e-learning studies in the field of accounting courses is presented.

The literature reviewed in this research was selected to help the researcher achieve the following objectives:

1. To review and understand the existing models and theories related to student outcomes in web-based courses
2. To help identify those factors that may affect student performance
3. To identify a model to be used as the conceptual framework for this study
4. To identify areas for exploration in group interviews
5. To identify question areas to be addressed in analysing the research data

The researcher followed the following search strategy in order to identify the literature that is relevant to the current study. The key words of the study topic, namely factors that affect student performance in web-based courses, were entered in web-searching engines such as Science Direct, and EBSCO to get information about related literature. The searching process was done by subjects and limited to full texts. The main concentration was on recent studies related to the subject. The references included articles from reputed journals, conference papers, theses and dissertations, text books, and websites. The references were selected after careful reading, evaluation and assessment of their relevance to the topic of this study.

2.1 Introduction

It has been claimed that online education has many advantages over traditional learning, in that it is available any time and any place for a worldwide society of learners (McDonald, 2002). McDonald concluded that Computer Mediated Communication (CMC) could expand upon and improve face-to-face learning by allowing more opportunities for discussion between learners and lecturers. The e-learning literature concentrates on the benefits of using online instruction (Arbaugh & Duray, 2002). For example, Chin et al. (2000) surveyed 157 students from 14 countries regarding their perceptions of online learning. All participants were enrolled in online education at Curtin University of Technology in Australia; they found that 97% of the students found this type of learning useful.

Arbaugh and Stelzer (2003) conducted a comprehensive review of the literature regarding student performance in traditional and online learning. They found that several studies revealed that there is no significant difference between the two types of learning. Moreover, some studies found that the e-learning students performed better, but a few indicated that the e-learning students performed worse. Daymont and Blau (2008) examined the differences between students' final grades in online and traditional learning courses while controlling for students' academic ability. The study sample consisted of students enrolled in seven sections of an organization and management course in the business school at a large public university. Two sections used asynchronous online courses, while the remaining five sections used traditional learning. The findings indicated no significant differences between student performance in the online and traditional sections.

However, a number of studies have failed to find any influence of web-based courses on student performance (Navarro & Shoemaker, 1999; Brown & Liedholm, 2003; Anstine & Skidmore, 2005). For example, Coates et al. (2004) conducted an experimental study to investigate differences between student performance (measured by the students' scores on the Test of Understanding College Economics (TUCE)) in traditional (F_2F) and online learning classes taught by the same instructor. The study surveyed 126 students enrolled in an introduction to economics course at three different universities with different levels of enrolment in graduate and undergraduate programs. Each university used a different textbook; also, two universities used WebCT to deliver the online material, while the third one used Lotus Notes/Top Class. The courses investigated were macroeconomics in two universities and microeconomics in the third university. The results showed that the outcomes of students in traditional learning were better than those of students in online learning.

Similar results were found by Brown and Liedholm (2002), who examined student performance in three different types of learning: face-to-face, hybrid and virtual. Participants in this study were 710 students consisting of 363 taught face-to-face by Liedholm, 258 taught in hybrid mode by Brown, and 89 taught virtually using materials from the F_2F and hybrid approaches. The students were enrolled in the Principles of Economics course at Michigan State University in the US. In order to measure student performance, the researchers used percentage of correct answers in an examination designed by them. The results of this study revealed the following:

- In total, the scores of students in the traditional face-to-face type of learning were the highest among the three modes.
- The scores of students in virtual learning decreased more rapidly than those of students in the other two modes.

Emelina-Pieter (2007) lends support to these findings. He conducted an experimental study to compare student performance in traditional and online learning. The online course was delivered using the Blackboard system. Participants were 59 graduate students who were distributed randomly between the traditional and online approaches (30 students in the traditional learning course and 29 students in the online course). They were enrolled in a research writing and presentation course, and the two groups were evaluated using the same instruments (i.e., assignments, exams and exercises). The findings of this study revealed that student performance, which was measured using the average of students' final grades, was better for the traditionally taught students than for the online students.

Gano and Dellosa (2007) conducted a study to examine the influence of the e-learning approach on students' academic performance. The study was conducted on 28 students enrolled in two sections of the algebra course offered by the Department of Mathematics and Statistics at the University of the East in the Philippines. The study's sample consisted of two different groups (sections) of 14 students each. One section was taught using the classroom approach, but the other section was taught using the online approach. To examine student performance, a pre-test and a post-test were held; the results revealed no significant differences between student performance in the two sections.

On the other hand, some researchers have indicated a positive relationship between the use of online learning and student outcomes (Agarwal & Day, 1998; Kulik, 1999; Fuchs &

Woessmann, 2004). For instance, Sosin et al. (2004) conducted a study to investigate the effect of using information technology (WebCT, Blackboard, e-mails, web-based materials, and courseware) on student performance, which was measured using the Test of Understanding College Economics (TUCE). Participants were 3,986 students enrolled in 67 hybrid learning sections (groups) of two introductory courses in economics (micro and macroeconomics), taught by 30 instructors in 15 different institutions. The researchers found a positive, significant relationship between the use of technology and student performance in both courses.

The previous discussion shows mixed results regarding the effect of e-learning on student performance. These results are summarized in Table 2.1.

Findings of the Studies	Authors
E-learning does not affect or have a negative influence on student performance.	Shoemaker, 1999; Brown & Liedholm, 2002; Brown & Liedholm, 2003; Coates et al., 2004; Anstine & Skidmore, 2005; Gano, 2007; Navarro & Pieter, 2007.
E-learning affects student performance positively.	Agarwal & Day,1998; Fuchs & Kulik, 1999; Sosin et al., 2004; Woessmann, 2004

Table 2.1: Summary of the findings of studies regarding the impact of e-learning on student performance

Based on the previous discussion regarding the influence of e-learning on the performance of learners, several studies have attempted to examine the effect of more than one variable. For example, personal characteristics (Sankaran & Bui, 2001; Shih & Gamon, 2001; Hong, 2002; Wang & Newlin, 2002; Dowling et al., 2003; Thurmond, 2003), student interaction in the web-based learning environment which has been linked to the interaction of instructors (Soon et al., 2000; Dennen et al., 2007; Gallien & Oomen-Early, 2008), student perceptions of the use of technology (Billings et al., 2001; Thurmond, 2003) and student participation in the online learning environment (Wang et al., 2001; Coldwell et al., 2008;) have all been examined.

Table 2.2 presents the findings of several studies regarding the effect of different variables on student outcome. These studies are discussed in detail in the following sections of this chapter.

Author (s)	Factors	Student outcome	Major results
Soon et al. (2000)	Timely feedback of instructors	Student satisfaction	Positive and significant direct effect of the timely feedback on student satisfaction.
Billings et al. (2001)	Student perceptions of interaction with technology	Student satisfaction	Student perception of technology had direct effect on student satisfaction
Shih & Gamon (2001)	Motivation, attitude, learning style, and demographic variables	Student achievement (students' grades at the end of the semester)	Only motivation had direct effect on student achievement.
Sankaran & Bui (2001)	Learning strategies, and motivation	Student performance (pre-test score)	Learning style and motivation had positive effect on student performance.
Hong (2002)	Gender , learning style , age , initial computer skills, time spent on the course , student-student interaction, GPA, and student-instructor interaction	Student satisfaction and achievement	GPA had direct effect on student achievement. Computer experience and student-student interaction had direct effect on both student satisfaction and achievement.
Wang & Newlin (2002)	Self-efficacy , and online course activity	Performance (total points earned and final exam score)	Self efficacy affected student final exam positively. Online course activity affect total points earned positively.
Dowling et al. (2003)	Teaching model, age, gender, mode of study, previous performance, and location	Learning outcome (Final mark in the unit)	Teaching model had significant positive effect on student learning outcome. Age and location had negative effect on learning outcome.
Dennen et al. (2007)	Instructor interaction	Student performance	Instructor interaction had positive effect on student performance.
Coldwell (2008)	Student participation in the online environment, Gender, Age, and Nationality (Asian or Western)	Student performance(final grades)	Student participation positively affected student performance. Female students participated and performed better than males. Asian students participated more than Western students but performed less.
Hammoud et al. (2008)	Instructor attitudes, student attitudes	Students' grades	Instructor attitudes affected student attitudes positively, which affected student achievement and participation in the web-based learning environment positively.
Gallien & Oomen (2008)	Instructor feedback	Academic performance	Instructor interaction had a positive effect on students' academic performance.

Table2.2: Summary of some studies' results that tested different variables on student outcomes

Sun et al. (2008) investigated several factors that may affect student satisfaction; they summarized these factors tested in the e-learning literature into 6 dimensions and 13 variables as seen in Table 2.3.

Dimension	Variables
Learner	Attitude toward computers, learner computer anxiety, and learner Internet self-efficacy
Instructor	Instructor response timeliness and instructor attitudes toward e-learning
Course	E-learning course flexibility and e-learning course quality
Technology	Technology quality and Internet quality
Design	Perceived usefulness and perceived ease of use
Environment	Diversity in assessment and learners' perceived interaction with others

Table 2.3: Summary of Sun's et al., study

Sun et al. (2008:1184) argued that "These factors cover nearly every aspect of the e-learning environment." They examined the relationship between these factors and e-learner satisfaction. The researchers conducted several interviews with e-learners and developed a questionnaire that was distributed to 295 students enrolled in 16 different e-learning courses at two public universities in Taiwan. Certain findings of this study are summarized as follows:

1. On the learner dimension, only learner computer anxiety had an impact (i.e., a negative influence) on e-learner satisfaction.
2. On the instructor dimension, it was found that instructor attitudes affect students' perceived satisfaction positively, while timely feedback did not influence e-learner satisfaction.
3. At the same time, they found that both variables related to the course dimension (quality and flexibility) significantly affected e-learner satisfaction.
4. The two variables of the design dimension (perceived usefulness and ease of use) had a significant impact on e-learner satisfaction.

Jiang and Shrader (2001) investigated factors that might affect student satisfaction and performance in a sample of 120 master's students at Western Governors University. The researchers examined the effect of four factors (i.e., pre-assessment results, interaction with the mentor, number of on-line courses taken and demographic variables) on student satisfaction and performance. They developed a survey, revised and expanded upon by a group of researchers, to measure student satisfaction, and they depended on the average of the domain assessment (objective tests, essay tests and portfolio activities a student had passed) to measure student performance. They found that overall satisfaction was high, at an average of 3.18 out of 4, but they also found that only weekly interaction with the mentor had a significant, positive relationship with student satisfaction. The findings also showed that four variables (study hours, contact with mentor, student-mentor interaction and courses taken) were significantly and positively correlated with academic progress. In addition, this study revealed that there was no significant relationship between some of the demographic variables (e.g., age and gender) and academic progress. The study concluded that courses taken and study hours were significantly and positively correlated with academic performance.

However, the noticeable feature of almost all of these studies is that they did not control for student characteristics. This might lead one to question the process of attributing the outcomes in web-based courses to environmental factors related to virtual learning. A student might perform better than his/her peers in web-based courses due to his/her positive experiences in using the Internet or due to his/her attitude toward this type of learning, so it is important to control for these characteristics (Thurmond, 2003).

2.2 Theories and models related to learner outcomes

Astin (1993:38) stated that, "Student outcomes refer to those aspects of students' development that the institution either does influence or attempts to influence through its education programs and practice." According to Matthews (2007), the literature contains different theories and models related to student change in college (i.e., individual development). Among these theories and models are developmental theories that depend on psychological differences between individuals to explain student development (Franklin, 1993). Stage and Dannells (2000) have classified the developmental theories into three main types: psychosocial theories, cognitive theories and typology theories.

Psychosocial theories are concerned with the psychological and social development of students, cognitive theories attempt to explain the intellectual development students attain as a result of the college experience and typology theories attempt to describe personality types and explain why one person might respond differently than another to the same situation (Stage & Dannells, 2000).

Stage and Dannells (2000:26) stated that college impact models "attempt to explain the context—the physical and human aggregate characteristics of a setting—within which student development takes place. Essentially this area of research is concerned with the interaction between person and environment"

As the main purpose of this study is to explore the environmental variables that affect student performance, the theoretical framework of this study is based on college impact models. More than one model addresses the impact of college factors on student change. The best-known models are as follows (Matthews, 2007):

- Tinto's model (1975)

- Pascarella's model (1985)
- Astin's (1993) Input-Environment-Outcome model

The main purpose of Tinto's model is to investigate the process of student attrition in the US and the factors that influence student decisions to leave college or university. According to this model, six factors that affect student attrition (outcome) are taken into consideration: pre-entry attributes, goals, commitments, instructional experience, the impact of the instructional experience on goals and commitments and outcome (Heywood, 2000). Some of the findings yielded from applying this model have indicated that a student's integration with the system has a positive relationship with student retention (outcome) and a student's subsequent commitment to the institution.

In 1985, Pascarella suggested a general causal model in which student development (student learning and cognitive development) is influenced directly and indirectly by five categories of independent variables: student background, precollege traits, institutional structure and organizational characteristics, interaction with socializing agents and quality of the student's effort (See Figure 2.1). Franklin (1993:9) argued that "Pascarella's model provides a comprehensive framework for assessing students' outcomes and explaining the influences which affect those outcomes". In this model, the researcher hypothesized the following:

- The student's background and precollege traits have a direct and indirect effect on student learning and cognitive development.
- There is an indirect relationship between the structural and organizational characteristics of institutions and student outcomes.
- The institutional environment has a small indirect influence on student outcomes.
- The interaction with peers and faculty has a substantial effect on student outcomes.

- Finally, the quality of the students' efforts has a positive and direct influence on student outcomes.

However, it is important to know what causes variations in student performance (outcomes) and whether differences in students' personal characteristics have a major influence on their performance or whether this is caused by other variables.

Thus, it is important to control for student characteristics in order to investigate the effect of other variables on student performance without any bias (Thurmond, 2003). In order to do so, this study used the Input-Environment-Outcome (I-E-O) model developed by Astin (1993). Astin's conceptualization provides a good base for the investigation of the effect of the background traits of learners and collegiate experience on their outcomes (Strayhorn, 2008), which is the purpose of this research (See Figure 2.2).

Figure 2.1: Pascarella's Model

It has also been argued that Astin's model is more parsimonious than other college impact models, because it only includes three main variables (input, environment, and outcome), while the other college impact models contain multiple levels, phases and concepts. This makes Astin's model easier for researchers to understand, explain and operationalize (Strayhorn, 2008). In addition, this model has been used widely in the traditional learning, but limitedly in e-learning contexts, which distinguishes it from the previous two models.

2.2.1 Astin's (I-E-O) model

The main thrust of this model is that in order to make a complete evaluation of any educational process, information about inputs, educational environment and student outcomes must be taken into consideration. Astin (1993:16) argued that this model, as summarized in Figure 2.1, "provides a powerful framework for the design of assessment activities and for dealing with even the most complex, and sophisticated issues in assessment and evaluation". It is very important to include input variables because inputs have direct effect on both environment and outputs (Arrows A, and C). Thus, inputs affect outputs directly (Arrow C) and indirectly through environment.

Figure 2.2: Astin's model

It has also been argued that the “I-E-O model was designed to address the basic methodological problem with all non-experimental studies in social sciences” (Astin & Sax, 1998: 252). Astin (1993:18) also made the following argument regarding the component of the I-E-O model: “Input refers to those personal qualities the student brings initially to the educational program. Environment refers to the student’s actual experience during the educational program…which includes those things that the educator directly controls in order to develop the student’s talent. Outcomes refer to the “talent” we are trying to develop in our educational program which may include post-tests, and results, or consequences”.

This model was mainly developed to control for student characteristics [input differences] so that the relationship between the other variables [environment] and student outcome could be investigated accurately. Accordingly, this model helps by providing researchers with more precise results in investigating factors that affect student outcomes. According to Astin, without controlling for student characteristics (inputs) at the beginning of the learning experience, the causal inferences regarding the relationship between the practice (environment) and outcomes of education can be incorrect. The current study controlled for student characteristics while exploring the impact of environmental factors. In addition, Astin (1993:21) stated, “Knowing what particular environmental experience each student has had helps us to understand why some students develop differently from others”. Therefore, the main purpose of this model is to control for input differences in order to determine the effect of environmental variables on student outcomes.

This study adopts Astin’s model for the following reasons:

1. This model has been used widely in previous studies (see Section 2.2.2).

2. This model takes into account differences in input, such as student characteristics, which reduces the possibility of omitted-variable bias in determining how other variables [environmental] affect student outcomes [output] (Thurmond, 2003).
3. The I-E-O model allows the researcher to take into consideration student characteristics, environmental factors and student outcomes. Accordingly, the process of evaluating these three elements can improve the argument regarding the causal conclusion of educational practices and student performance.
4. Astin's model is easier to understand and operationalize in research than other models (Strayhorn, 2008).

2.2.2 Empirical studies using the I-E-O model

This model has been widely used to examine the relationship between inputs, environmental variables and output variables in traditional learning contexts (Astin, 1968; Knight 1994; Campell and Blackey, 1996; Astin and Sax, 1998; House, 1999) and in e-learning contexts (Thurmond et al., 2002 Thurmond, 2003;) (see Table 2.3).The pioneering study was that of Astin (1968). The main purpose was to investigate the influence of environmental variables related to institutional excellence (such as number of library books, student-to-faculty ratios, percentage of faculty with doctoral degrees ("doctoral coverage") and type of college town) on student performance measured by GRE score. The researcher concluded that none of the environmental variables influenced student performance significantly when controlling for undergraduates' background characteristics.

Knight (1994) used the I-E-O model in his exploratory study to explore those factors that influence the time needed to graduate with a bachelor's degree [outcome]. Participants were 868 students enrolled at Southeastern University in the US. The results indicated the following:

- The input variables (admission status, age, high school GPA, SAT scores) had a major positive impact on time to complete the bachelor's degree [outcome].
- The environmental variables (living on campus and enrolment in an orientation course) substantially and positively influenced the time to complete the bachelor's degree.

Astin and Sax (1998) investigated the relationship between input variables (race, gender, pre-test scores) and environmental variables (students' major and structural characteristics of institutions such as size, type and selectivity) and participation in volunteer service programs such as education, public safety, human needs, environment and multiple outcomes (civic responsibility, educational attainment and life skills). Using hierarchical regression analysis, the results showed a positive relationship between the environmental factors and outcome variables after controlling for the input variables.

Campbell and Blakely (1996) used the I-E-O model to determine if the persistence and performance [outcomes] of underprepared students were affected by early remediation (completion of a developmental reading course) [environment]. Participants in this study were 3,282 students enrolled in Midwestern suburban community colleges in the US. The results indicated that GPA, number of remedial courses, early remediation and degree-seeking intent played a major role in predicting student persistence, whereas age, ethnicity and degree-seeking intent were significant predictors of student performance.

House (1999) used the I-E-O model to determine the relationship between input variables (GPA in high school, expectation of graduation with honours, the student's rating of his or her overall academic ability), environmental variables (time spent studying/working on group projects, changes in study major, employment status, satisfaction with course instruction, time spent on communication) and student outcomes (satisfaction and degree completion). The findings of this study revealed the following:

- Among the input variables, only GPA in high school affected student satisfaction, and the same factor was found to be a significant predictor of degree completion.
- Each of the following environmental factors affected student satisfaction significantly: course instruction, participating in group projects and time spent on communication.
- Environmental factors that played a significant role in predicting degree completion were satisfaction with quality of instruction, changes in study major, time spent on communication and participation in group projects.

Another study conducted by Zheng et al. (2002) investigated the predictors of academic success for 26,000 students enrolled in a Midwestern university in the US. Using the I-E-O model, the researchers divided the study's variables into input characteristics (demographic and psychological variables) and environmental variables (residence characteristics). The researchers found that the GPAs of students had a significant relationship with seven input variables: high school GPA, gender, parents' educational level, marital status, ethnicity, self-perception of abilities and future expectation about graduation with honours or changing major. Moreover, two environmental variables (i.e., learning community membership and academic college) were found to be significantly associated with the GPAs of students.

Strayhorn (2008) conducted a study to investigate the relationship between student engagement (in-class discussion, faculty-student interaction, peer interaction and active learning) and the social and personal development of students. Participants were 8,000 undergraduates selected randomly from the relative population of those who responded to the 2004-2005 national administration of the College Student Experience Questionnaire (CSEQ) in the US. This questionnaire was mainly developed to measure the quality and quantity of student involvement in college activities and their use of college facilities. Participants were undergraduate students enrolled at four-year granting institutions. Using the I-E-O model as the study's theoretical framework, several demographic variables were included as inputs (sex, marital status, age, years in college and race) and environmental variables (in-class discussion, faculty-student interaction, peer interaction and active learning). The researcher found that the social and personal development of students (outcome) was significantly associated with faculty-student interactions ($r = 0.36$, $p < 0.01$), peer interactions ($r = 0.46$, $p <0.01$) and active learning ($r = 0.41$, $p < 0.01$). He also found that all of these variables explained 24% of the variance in student outcome (social and personal development).

Thurmond et al. (2002) and Thurmond (2003) applied the I-E-O model in the field of e-learning. The first study aimed to explore those factors that might predict student satisfaction [outcome] in web-based courses. Five input characteristics were included as predictors of student satisfaction: perception of computer skills, knowledge of electronic communications, number of web-based courses taken, distance from main campus and age. Environmental variables (predictors) were whether faculty were encouraging, degree of student contact, whether reciprocity and cooperation were developed, whether students engaged in active learning, whether quick feedback was provided, the amount of time dedicated to a task and whether diversity was respected. The study's findings revealed that none of the input variables could predict the level of student satisfaction, but there was a significant, positive relationship between the environmental variables and student satisfaction ($R^2 = 0.52$).

Thurmond (2003) used the I-E-O model to investigate the effect of student characteristics [input] (computer experience, age and distance from campus) and classroom interaction [environment] on student satisfaction and re-enrolment [outcomes]. The findings of this study revealed that four variables played a major role in predicting student satisfaction and willingness to re-enrol: learner-instructor interaction, student perceptions of their interface with technology, student perceptions of instructors and students' presence and distance from campus. These variables explained about 60% of the variance in students' willingness to re-enrol.

The previous empirical studies of Astin's model, which are summarized in Table 2.4, show the following:

- The relationship between the three elements of the model was supported (Knight, 1994), and both input and environmental factors help predict student outcome (Campbell & Blakely, 1996; House, 1999; Thurmond et al., 2002; Thurmond 2003).
- The three elements (input, environment and outcome) should be taken into consideration; otherwise, it is not easy to make any interpretation of the research findings (Knight, 1994).
- The input and environmental factors exercise a causal effect on student outcomes (House, 1999).

Based on the previous discussion, this study investigates more than one variable that may affect student performance in web-based courses. These factors are organized into two main dimensions based on the I-E-O model: students' personal characteristics [input variables] and student interaction in web-based courses [environmental variables]. According to the researcher's knowledge and search of the literature, these factors have not previously been integrated into one framework to test their relationship with learner performance [outcome].

Author	Input Variables	Environmental Variables	Outcome Variables	Major findings
Astin (1968)	• Gender • Intended field of study • Size of high school class	• Number of library books • Student-to-faculty ratio • Percentage of faculty with doctoral degrees • Type of college town	• GRE score	• No significant relationship was found between the input and environmental variables and student achievement on the GRE.
Campbell & Blakely (1996)	• GPA • Ethnicity • Gender • Age	• Early remediation • Number of remedial courses • A degree-seeking intent	• Performance and persistence	• All input variables and only one environmental variable (A degree-seeking intent) had significant direct effect on students performance and persistence.
Astin & Sax (1998)	• Demographic variables • Race • Gender • Pre-test scores	• Students' major Structural features of institution	• Students' academic and life skills • Awareness of civic responsibilities • Academic performance	• A positive relationship was found between environmental factors and student outcomes.
House (1999)	• High school GPA • Self-rating of overall academic ability • Expectation of graduation with honours	• Hours spent studying • Participating in class group projects • Change in major area of study • Satisfaction with quality of instruction	• Student satisfaction • Degree completion	• There was a direct significant effect of the environmental and input variables on student outcomes.
Knight (1999)	• Age • Gender	• Time spent on the degree • Distance from campus • Institutional polices	• Completion of degree	• There was a significant positive effect of several input and environmental variables on outcome.

Table 2.4: Summary of the empirical studies that have used Astin's I-E-O model

Author	Input Variables	Environmental Variables	Outcome Variables	Major findings
Thurmond et al. (2002)	• Perception of computer skills • Knowledge of electronic communications • Number of web-based courses taken • Distance from main campus • Age	• Encouraging faculty / student contact • Developing reciprocity and cooperation • Engaging in active learning • Providing quick feedback • Amount of time dedicated to a task • Respecting diversity	• Student satisfaction	• None of the input variables can predict the level of student satisfaction. • A significant, positive relationship between environmental variables and student satisfaction was found.
Zheng et al. (2002)	• Demographic and psychological variables	• Residence characteristics	• Student performance (GPA)	• High school GPA, gender, parents' educational level, marital status, ethnicity, self-perception of abilities and future expectation about graduation with honours or changing major significantly associated with student GPA • Two environmental variables (learning community membership and academic college) were significantly associated with student GPA.
Thurmond (2003)	• Computer experience • Age • Distance from campus	• Classroom interaction	• Student satisfaction and re-enrolment	• Learner-instructor interaction, learner perceptions of their interface with technology, student presence and distance from campus played a major role in predicting student satisfaction and willingness to re-enrol.
Strayhorn (2008)	• Gender • Marital status • Age • Year in college • Race	• Students engagement (in-class discussion, faculty-student interaction, peer interaction, active learning)	• Social and personal development	• The social and personal development (outcome) of students was significantly associated with faculty-student interactions, and these variables explained 24% of the variance in student outcome.

Table 2.4: (Continued): Summary of the empirical studies that have used Astin's I-E-O model

2.3 Student characteristics [input]

Several researchers have investigated a range of student characteristics in web-based education such as age, gender, computer experience, self-efficacy, motivation and attitude (Fredericksen et al.,2000; Leasure et al.,2000; Swan et al., 2000; Hong, 2002; Lee,2002; Wang & Newlin, 2002; Dowling et al., 2003; Friday et al., 2006; Daymont & Blau, 2008).

The current study focused on the following characteristics: computer experience, self-efficacy, attitude, motivation and prior performance. These factors were chosen because they have been mentioned frequently in the literature and are considered the most significant characteristics that might affect student performance (Mckenzie & Schweltzer, 2001; Shih & Gamon, 2001; Piccolo, 2001; Sankaran & Bui, 2001; Wang & Newlin, 2002; Dowling, 2003;Thompson & Lynch, 2003; Ergual, 2004; Koohang, 2004; Al-Khadash & Abuloum, 2005; Roberts & Dyer, 2005; Liu et al., 2008).

2.3.1 Computer experience (CE)

In the context of this factor, the literature concentrates on computer skills and prior experience with technology. Research results differ where the influence of computer skills on student performance is concerned (Thurmond, 2003). Some researchers have highlighted the importance of this factor on student performance in web-based courses prior to enrolment in such courses (Leasure et al., 2000; Swan et al., 2000; Attack & Rankin, 2002). For instance, Jiang and Ting (1999) found that students with low levels of computer skills were not satisfied with web-based courses, but other studies did not find any influence of this factor on student satisfaction [outcome] (Leong et al., 2002; Thurmond et al., 2002).

Muse (2003) conducted a study to explore factors that lead to success in web-based courses. Participants were 350 students out of 1028 students enrolled in the web-based courses at Montgomery University. The researcher found that the computer skills variable was the main factor that explained the variation in student performance and that this factor explained 25% of the variation in student achievement. However, Hong (2002) found that initial computer skills had no relationship to the achievement of 26 students enrolled in a master of science program at University Malaysia Sarawak in Malaysia.

Moreover, several researchers have highlighted the importance of the prior experience of students using online technology in relation to their performance (Kennedy, 2000; Piccoli et al., 2001; Dutton et al., 2002; Thurmond 2002; Koohang, 2004; Nakayama et al., 2007). For example, Shany and Nachamis (2001) found that the most successful students were those who had prior experience in information and communication technology. When students have significant experience in web-based courses, this may contribute effectively to success, because they will use this experience to develop new strategies to enhance their performance (Clayton et al., 1992). This will increase their familiarity with the system, which positively affects performance (Arbaugh & Duray, 2002). However, some researchers have indicated that this type of learning does not benefit from prior computer experience and that, in consequence, such experience does not affect student outcomes (Shih et al., 2006). However, this may be due, in part, to variations in the availability of support and assistance (Thurmond, 2003).

On the other hand, some researchers have addressed the importance of computer skills in student participation in online courses (Anderson & Lee, 1995; Ross, 1996). For example, Zafeiriou et al. (2001) conducted a study to examine those factors that influence student participation in CMC. Participants were 50 graduate and undergraduate students enrolled in two different departments, the Department of Information Studies and the Management School at the University of Sheffield. The researchers used quantitative and qualitative approaches, and the findings revealed that the students' familiarity with computers positively affected their participation in CMC.

Another study was conducted on eight students enrolled in a graduate online course at a major Southwestern university in the US. The course was supported with computer conferencing software called First Class and used qualitative and observational approaches to collect the necessary data. Varisdas and McIsaac (1999) found that prior experience in CMC technology was one of the major factors that positively influenced student participation.

2.3.2 Motivation (MO)

It has been argued that student motivation is an important factor for success in web-based courses (Schuemer, 1993), because they need to work independently on difficult issues as well as control their time (Sankaran & Bui, 2001). Other studies have found that motivation is one of the best predictors of student outcomes (Leidner & Jarvenpaa, 1995; Hendrickson, 1997; Shih & Gamon, 2001; Thompson & Lynch, 2003).

For example, Shih and Gamon (2001) investigated the impact of student motivation among other variables on their achievement measured by the students' grades at the end of the semester. The researchers distributed a questionnaire to 99 students enrolled in two biology courses at a US university. The results showed a significant, positive relationship between student achievement and motivation ($r = 0.53$). Moreover, student motivation explained about 28% of the variance in student achievement.

In the same context, Roberts and Dyer (2005) conducted a study to investigate the effect of more than one variable on student achievement; among these variables was student motivation. Participants in this study were 322 students enrolled in all online courses at the University of Florida in the US. The regression analysis of this study revealed that motivation is a significant predictor of student achievement ($t = 3.610$, $p < .01$).

In addition, several researchers have indicated that students with low levels of motivation have low levels of participation in online courses (e.g., Author et al., 2006; Hew & Cheung, 2008; Xie & Ke, 2009). Xie and Ke (2009) conducted a study to examine the relationship between students' intrinsic motivation and their participation in the online environment. Participants were 18 graduate and 6 undergraduate students enrolled in two different sections of an online instructional technology course at a large Southeast university in the US. The study revealed that students' intrinsic motivation played a major role in student interaction in the online environment.

Another study conducted by Rodriguez et al. (2008) examined the influence of more than one variable on student perceptions of the quality of technology used in their online learning courses. Participants were 300 students enrolled at a Midwest university in the US. The results indicated that students with higher motivation were those who perceived the quality of the technology used in the online learning courses positively, as they were more satisfied with online learning.

2.3.3 Student Attitudes towards web-based learning (SA)

Several studies have concentrated on students' enjoyment of web-based learning and students' evaluations of the attractiveness of web-based learning (Fishbein & Ajzen, 1975; Sankaran et al., 2000; Lim 2001; Piccoli 2001; Hammoud et al., 2008; Xie & Ke, 2009). Moreover, learners believe that web-based learning provides new knowledge, saves time and cost and allows freedom of learning (Yu & Yan, 2006). Several studies have found that student attitudes and feelings of comfort towards technology and the course format affect their performance directly (Sankaran et al., 2000; Sivo et al., 2007). However, Shih and Gamon (2001) found that student attitudes do not affect student achievement, as it explained only 1% of the variance in student achievement in their study.

For example, Sankaran et al. (2000) investigated the effect of student attitudes toward the course format on their performance measured by final scores. Participants were 116 students enrolled in two different sections of an extensive four-week computer course. One section used the web-based format, and the second section used the lecture format. The results of this study indicated that there was no significant difference between student performance in the two sections despite the attitude differences toward the class format between the two sections.

Another study on the effect of student attitudes toward web-based courses on their performance was conducted by Sivo et al. (2007). Participants were 217 students enrolled in a web-based psychology course offered using the WebCT system. The findings of this study revealed that student attitudes were the only factor that affected student performance (measured by final grade) significantly.

It has been found that student attitudes toward web-based learning are highly affected by instructor attitudes toward this type of learning; thus, this affects student achievement (Hammoud et al., 2008). The positive attitudes of instructors encourage students to interact with each other and with their instructor, which is reflected in their achievement (Hammoud et al., 2008). Due to this major effect on student outcomes, instructors should be chosen carefully and selectively (Hammoud et al., 2008).

The work of Hammoud et al. was conducted at Brunel University, UK. They examined the effect of instructor attitudes on student attitudes and achievement. Participants in the study were 131 undergraduate students enrolled in the second level of a web-based course offered by the School of Information Systems that used the WebCT system. Students were in two groups; the first one was taught by an instructor who had a positive attitude toward using the WebCT system, while the second one was taught by an instructor who did not. Using data collected from the WebCT internal tracking system to measure the frequency of each student's web page visits, the researchers found that student attitudes and performance were affected by their instructor's attitudes. They also found that the students who engaged with the instructor who had a positive attitude toward using the WebCT system accessed the web-based course more often than the students in the other group.

On the other hand, Hong et al. (2003) conducted a study in Malaysia on 88 undergraduate students from five different faculties to investigate student attitudes toward the use of the Internet. One of the relationships examined was between this factor and student perceptions of the learning environment. The results indicated a significant, direct relationship between student attitudes toward using the Internet in the learning process and their perception of the learning environment in assisting and promoting the learning process.

2.3.4 Self-efficacy (SE)

Among the personal factors that have an impact on student performance is self-efficacy, which refers to "people's judgment of their capabilities to organize and execute courses of action required to attain a designated type of performance" (Bandura, 1986: 391).It has been indicated that self-efficacy affects learner attitudes toward the use of technology (Compeau & Higgins, 1975). Therefore, self-efficacy affects student performance (Wang & Newlin, 2002). Wang and Newlin's work was conducted to investigate whether student self-efficacy regarding online classes would predict their performance. Participants were 122 students enrolled in one of six web-based sections of Research Methods of Psychology at the University of Central Florida in the US. Researchers found that students with high self-efficacy had better performance.

In Taiwan, Liu et al. (2008) examined the effect of self-efficacy among other variables on learner achievement and interaction. Participants were 46 students enrolled in a web-based computer course. The researchers distributed a seven-point Likert scale questionnaire to measure the students' self-efficacy level. They also collected the students' grades on the course projects and homework as a measure of student performance. They found a significant, positive relationship between student self-efficacy and overall student performance. In addition, they found that student interaction was not affected by student self-efficacy.

Ergul (2004) investigated the relationship between student characteristics (including student self-efficacy) and academic achievement measured by the average grade per lesson. The study population was 124 students enrolled in more than one web-based distance-learning course, such as finance, economics, industrial and business administration and public administration. The researcher used a five-point Likert scale questionnaire to gather information about the learners' personal factors (e.g., gender, age and employment situation) and self-efficacy. Ergul found that self-efficacy had a significant, positive relationship with the students' academic outcome ($r = 0.249$, $p < .01$), but there was no significant relationship between other student characteristics (e.g., gender, age, employment status) and academic performance.

2.3.5 Prior performance (PP)

It has been indicated by the literature that the main predictor of student performance is prior student performance (Mckenzie & Schweltzer, 2001; Dowling, 2003; Roberts & Dyer, 2005). For example, Mckenzie and Schweltzer (2001) conducted a study on 197 first-year Australian university students enrolled in the faculties of science and information technology to investigate the influence of previous academic performance and psychosocial, cognitive and demographic variables on student performance. They found that the most significant predictor was the student's score on the university entry exam (prior performance), as this explained 39% of the variance in student GPA. Moreover, Roberts and Dyer (2005) studied students enrolled in all online courses given over six weeks at the University of Florida in the US. They found that prior student performance in a parallel pre-test was one of the main predictors of student achievement on a post-test.

On the other hand, Hsu et al. (2003) conducted a study on 126 students enrolled in a strategic management course at a private university in Taiwan to examine the effect of more than one student characteristic on student e-learning participation. The results indicated that student academic ability (measured by student GPA) is the only predictor of student e-learning participation.

2.4 Environmental factors (Student perceptions of the interaction activities in the web-based courses)

Astin (1993: 81) stated, "Environment encompasses everything that happens to a student during the course of an educational program that might conceivably influence the outcome under consideration". He also stated, "Environmental information is especially critical here, since the environment includes those things that the educator directly controls in order to develop the students' talent" (ibid:18).It is important to recognize any factor that may affect student performance in a virtual learning environment in order to maximize the benefits from this type of learning. These factors must be taken into consideration while designing and delivering online courses (Alstete & Beutell, 2004).

One of the most important environmental factors in web-based courses that affects student outcome is student interaction (Thurmond, 2003). Examining this factor and its influence on student performance may help educators improve the learning process in web-based courses. Interaction in web-based courses considers the key principles for providing and developing good education (Thurmond, 2003). The principles of good education were published by Chickering and Gamson (1987) upon 50 years of research and summarised by Thurmond (2003: 13) as follows:

1- Encouraging faculty/student contact

2- Developing reciprocity and cooperation

3- Engaging in active learning

4- Providing quick feedback

5- Emphasizing the amount of time dedicated to a task

6- Communicating high expectations

7- Respecting diversity

It has been indicated that these principles are important for good education, both in the traditional and e-learning contexts (Chickering & Ehrmann, 1996). Several studies investigated the Interaction activities in e-learning and its effect on student outcomes. These studies tested the interaction of instructors (Soon et al., 2000; Dennen et al., 2007; Gallien & Oomen-Early, 2008), student perceptions of the use of technology (Billings et al., 2001; Thurmond, 2003) and student participation in the online learning environment (Wang et al., 2001; Coldwell et al., 2008).

2.4.1 Student perceptions of the interaction of the instructor (II)

The instructor's role is considered one of the most important factors that affects the effectiveness of web-based education (Collis, 1995) and a major influence on student outcome (Webster & Hackley, 1997). The activities of instructors in web-based courses (e.g., providing timely feedback, interacting with the students, helping promote student engagement in the learning process (Su et al., 2005)) enhance the effectiveness of this type of learning and thus positively affect student outcomes (Gallien & Oomen, 2008). The interaction of instructors with students is considered the most important interaction among other interactions that affect student perceptions regarding learning (Dennen et al., 2007), because students usually like to receive feedback from their instructors about their performance on assignments and exams (Dennen, 2005). This might be available in traditional courses, but it is one of the main concerns of students in the e-learning context (Conrad, 2002; Dennen et al., 2007). Instructor interaction is a primary factor leading students to a better understanding of the difficult ideas in their courses (Thurmond, 2003), and it positively affects student performance (Jiang & Ting, 1999; Swan, 2001).

A number of studies have focused on the importance of instructor interaction with students (Fredericksen et al., 2000; Soon et al., 2000; Swan, 2001; Thurmond et al., 2002; Thurmond, 2003). For example, Dennen et al. (2007) conducted a study to investigate the importance of 19 actions of the instructors in e-learning as to student performance. Participants were 32 instructors and 170 students from a private online university and a public university. The researchers found that instructors considered almost all of the 19 actions important to student performance. They gave the highest importance ratings to providing extensive feedback and providing examples, but the students gave the interpersonal communication actions (e.g., checking e-mails to assess learner needs, posting on the discussion board, providing examples and providing timely feedback) the highest importance ratings. Thus, this study highlights the importance of the interaction of instructors to student performance from the point of view of both instructors and students.

Fredericksen et al. (2000) investigated the relationship between student interaction with instructors in online courses and students' perceived learning. Participants were more than 1,400 students enrolled in an online course, and the researchers found that female students were better than males at using web-based courses. They also found a significant, positive relationship between student perceptions of instructor interaction and their performance; that is, the students who felt that they did not have proper interaction with their instructors felt that they learned less. In addition, Swan (2001) found that instructor-student interaction affects student outcome measured by satisfaction and perceived learning.

Instructor feedback helps students to increase their level of understanding and knowledge of their mistakes, which affects their future performance positively (Mason & Bruning, 1999). In a study conducted by Gallien and Oomen (2008) to examine the effect of instructor feedback on student performance, participants were all students enrolled in four online health education courses. The researchers found that student performance was positively affected by the type of feedback they received.

Soon et al. (2000) found that the failure of instructors to respond on time has a negative effect on student outcome. Thurmond et al. (2002) found that instructors' timely comments were significantly related to student satisfaction, which leads to better performance. In contrast, Pridemore and Klein (1995) compared the student performance of two different groups. The first group received prompt feedback, but the other one did not. The results revealed that there was no significant difference between the performances of the two groups.

2.4.2 Student perceptions of the use of technology (UT)

Using technology in education might improve the learning process, but the availability of technology alone is not enough to improve student outcome if it is not positively perceived by the learner (Thurmond, 2003). Selim (2003: 347) argued, “Students will accept course websites as a learning and teaching support technology if they perceive that this technology would help them to improve their learning effectiveness and efficiency.”

Therefore, students will interact with technology if they perceive that this technology will help them in learning the course’s content (Thurmond, 2003). However, student perceptions of the use of technology in learning are mainly affected by the technology infrastructure and the ability of technology to promote the productive use of time (Billings et al., 2001).

A quality technology infrastructure refers to whether “access to the Internet, course file servers, course software, and learning resources are available and reliable. There is not undue time logging on to the network.” Moreover, technology that promotes the productive use of time refers to “hardware and software that are appropriate to support goals of the course/program; course management software and collaborative learning tools that contribute to productive use of time and do not cause undue waste of time logging in, sorting messages, retrieving information, or spending time on topics not related to course work” (Billings et al., 2001: 45).

Lack of the necessary infrastructure (e.g., personal computers or access to the Internet) will affect student access to technology and their perceptions regarding interactions with computer technology (Varisdas and McIssac, 1999; Zafeiriou et al., 2001). Another reason for perceiving technology negatively is that students do not feel comfortable with technology, and they do not like to learn the whole course through the Internet, which affects their interactions with the computer technology (Thurmond, 2003). Therefore, if students perceive technology as time consuming or a waste of time, this will negatively affect their perceptions of the use of technology and thus their outcomes (Daley et al., 2001).

Recently, researchers have started to evaluate e-learning technology and its influence on student outcomes and learning (McGorry, 2003). Some researchers have indicated that the quality of technology plays a major role in the effectiveness of e-learning (Webster & Hackley, 1997). Others have concentrated on the necessity of taking system and Internet quality into consideration in designing web-based courses (Graham & Scarborough, 2001; Li, 2002).

On the other hand, Internet availability and lack of speed can affect student perceptions of the use of technology in learning, because they will encounter problems when accessing the course content (Thurmond, 2003), and this will negatively influence student performance (Piccoli et al., 2001). For example, Webster and Hackly (1997) examined the effect of Internet speed and system quality on the learning outcomes of 247 students enrolled in 29 different online courses in different majors such as accounting, mathematics, chemistry, physics, computer science, engineering, political science and sociology. The results highlighted the importance of this factor on student outcome, and they found that system quality (audio, video and graphics) related positively to student learning outcomes.

However, other studies have not found that difficulties in accessing technology affect student outcome negatively (Leasure et al., 2000; Kenny, 2002). For example, Kenny (2002) conducted a study to explore student experiences in online learning. Participants were 21 nursing students enrolled in a health informatics course at La Trobe University in Australia. The researcher conducted individual and group interviews using the thematic analysis method[1] and found that student perceptions of the use of technology was positive due to its flexibility (i.e., they were able to access the course anytime and anywhere). He also found that the students were confident in using computers despite the fact that some students lacked experience with computers. Accordingly, even if students have some difficulties interacting with technology (i.e., in web-based courses), this will not cause negative outcomes.

Another study was conducted by Parker et al. (2008) to investigate the main predictors of student perceptions regarding the use of technology in learning. Participants were 3,145 undergraduate students enrolled in the Department of Sociology at a large US public university. Using a web-based survey to collect the necessary data, the researchers concluded that the most powerful predictor of the student perceptions of the use of technology in learning was their GPA.

2.4.3 Student participation in online learning environments (SP)

The availability of an interactive environment in an e-learning system is considered an important factor that affects learner performance (Ting; 1998; Hong, 2002; Jiang & McGorry, 2003). The existence of an interactive environment is thought to improve student outcomes in more than one dimension (e.g., problem solving, thinking skills) (Liaw et al., 2007).

Novitzki (2000) investigated the use of asynchronous learning tools to support traditional learning and their effect on student performance at Johns Hopkins University in the US. All students enrolled in forty-three courses supported by the Blackboard system participated in this study. The researcher divided these courses into three main categories: low, moderate and high usage of the asynchronous learning tools. Performance was measured by the average grades obtained throughout the course and the final exam grade. The findings revealed that low and

[1] Thematic analysis is a common method used to analyse the qualitative data by identifying themes that represent the textual data (Howitt, and Cramer, 2008)

moderate usage did not have a significant relationship with the two measures of student outcome but that the extensive use of asynchronous learning tools to support traditional classes did (Chi-square = 14.41). This category included the effective use of interaction tools such as the bulletin board, threaded discussions and chat rooms.

Several studies have found that student participation in the online environment (e.g., interacting with peers, instructors and content) positively affects student performance (Wang & Newlin, 2000; Wang et al., 2001; Alstete & Beutell, 2004). For example, Wang et al. (2001) conducted a study to investigate the influence of student activities in the chat rooms of an online course on their performance. Participants were 22 students enrolled in a course on statistical methods in psychology at the University of Central Florida in the US. The results revealed that the number of statements and comments and the frequency of responses to the instructors' queries were correlated positively to the students' final grades.

Another study conducted by Coldwell et al. (2008) investigated factors that influence students' final grades in online courses. They tested student participation in online discussions. Participants were 500 students enrolled in wholly online courses to get a bachelor's degree in information technology in Australia. The researchers collected data on student participation from the students' tracking tools available from the online learning system, which provides statistics about the time each student spends online, number of messages read and posted by each student and course documents viewed by each student. The researchers divided the students into five categories according to their final grades: high distinction, distinction, credit, pass and fail. The findings of this study revealed that the students who obtained high grades (i.e., high distinction, distinction and credit) participated substantially more than those who obtained lower grades.

2.5 Student performance (P)

Picciano (2002:242) argued, "Student performance is open to many definitions… Successful completion of a course, course withdrawals, grades, added knowledge, and skill building are some of the ways that performance is measured depending upon the content of the course and the nature of the students." Astin (1993: 10) argued that one of the major areas of student assessment activity "occurs in connection with college courses. Three major forms of assessment are involved here: course examination, assessment of course projects (homework, term papers and course grades) and grades" He also argued, "The outcome variables are dependent variables, criterion variables, post-tests, output, consequents, ends, or endogenous variables" (ibid:18).

Various studies have focused on using more than one measure in identifying student performance in distance education, such as grades on exams, assignments and projects (Dziuban & Moskal, 2001; Fredericksen et al., 2001). Other studies have used student satisfaction as a very close and related variable to student performance (Navarro & Shoemacker, 2000). A number of studies have concentrated on students' final marks as a measure of student performance (Wang & Newlin, 2000; Shih & Gamon, 2001; Hong, 2002; Dowling et al., 2003; Davis & Graff, 2005; Nakayama, 2007).

2.6 E-learning in accounting

The use of information and communication technologies is considered one of the most important elements in accounting education (Elliot, 1992; Walsh, 1998). More than one accounting profession has called for applying information technologies into accounting classrooms (e.g., the American Accounting Association (AAA, 1989) and the Accounting Education Change Commission (AECC, 1990)).

The increasing development of technology and the rapidly changing accounting context generate the need for better methods to deliver accounting material to students (Albrecht & Sack, 2000), which has led to an increase in interest in using the Internet in education generally and in accounting particularly. The adoption of virtual learning to support traditional learning has been a focus of attention (De Lange et al., 2003; Marriott et al., 2004). Today, many universities and schools are investing in web-based education tools such as WebCT and Blackboard. As a result of this interest, the use of these systems by accounting educators in their classrooms is increasing rapidly (Watson et al., 2007). This growth provides an incentive to accounting educators to design effective virtual learning environments and exploit these packages to enhance the learning outcomes of students (De Lange et al., 2003).

Several studies have concentrated on student perceptions regarding the use of online or virtual learning in accounting education. For instance, Al-Khadash and Al-Hadrami (2006) have investigated the effect of using web-based materials in teaching accounting principles in Jordan. They concluded that student perceptions toward web-based courses are positively affected by the use of the web material. They also found that this type of learning has a significant, positive influence on students' understanding of the course concepts and ideas and students' computer skills.

Rainsbury and Malcom (2003) conducted a study to investigate student perceptions regarding the use of discussion boards in an intermediate accounting course to investigate if the use of such a tool would enhance student learning. The researchers designed a discussion board exercise that required students to discuss some accounting concepts and prepare financial statements. The participating students were divided into 16 groups, each group comprising four to six students. At the end of the course, the students were asked to complete a questionnaire regarding their personal information and their perceptions of the discussion board contribution. The results showed that student perceptions were positively associated with the use of the discussion board in improving their learning. The study also found a low positive relationship between students' evaluations of the discussion board and their final exam grades.

Another study conducted in Jordan by Al-Khadash and Abuloum (2005) attempted to identify the extent to which variables such as age, gender, GPA, frequency of accessing the web-based course and prior experience with the Internet can predict student perceptions toward a first-level accounting web course. Participants in this study were 440 students enrolled in six different sections of Accounting Principles (1) at the Hashemite University taught using the Blackboard system to support the traditional classes. Data was collected using a five-point Likert-type survey. Correlation analysis and stepwise regression techniques were used to analyse the data. The correlation analysis showed a positive, significant relationship between student perceptions toward the web-based course (Accounting1) and the frequency of accessing the web-based course ($r = 0.279$) and prior experience with the Internet ($r = 0.223$). However, they found a low negative insignificant relationship between the remaining variables and student perceptions toward the web-based course (Accounting 1). The stepwise analyses showed that prior Internet experience and the frequency of access to the web-based course were significantly associated with student perceptions (R square = 0.115, $p < -.001$).

Love and Fry (2006) analysed student perceptions towards the role of the virtual learning environment in developing their learning. The researchers surveyed 36 first-level accounting students who enrolled in an introductory accounting course at a UK business school that uses the Blackboard system as a supplementary tool. The researcher interviewed four focus groups in order to gather substantive data about student perceptions regarding the use of the web-based management tool. The findings of this study revealed that some students perceived the VLE as a springboard that included downloadable information and material that helped them to complete their coursework, but other students identified the VLE as a safety net that enabled them to catch up on any core material delivered to the students during their absence. In addition, the researchers found that the students preferred face-to-face interaction with their instructor to online interaction.

A number of studies have tested student preferences regarding the face-to-face method and the web-based approach in accounting courses (Borthick & Jones, 2000; Broad et al., 2000). Dunbar (2004) conducted a study to investigate student preferences regarding the use of traditional or online learning. The study surveyed 115 students enrolled in a graduate tax course. The results revealed that 56% of the students preferred online learning and that they would choose this mode of study if they had the opportunity to do so.

Similarly, De Lange et al. (2003) conducted a study to elicit the satisfaction of 292 students who enrolled in an introductory accounting course using a number of WebCT features such as the bulletin board, online assessment and chat room. Regression analysis was used to analyse the data collected from the participants, and the study findings revealed that student satisfaction with the use of virtual learning using WebCT had a significant, positive relationship with the provision of lecture notes and use of bulletin board and other tools such as video and chat.

Gagne and Shepherd (2001) conducted an experimental study involving two classes of an introductory accounting course. One class was taught traditionally, while the other class was taught virtually. The two classes were taught by the same lecturer, using the same textbook, assignments, exams and syllabus. The findings revealed that the performance, measured by exam and project grades, of the online students was similar to the performance of the face-to-face students.

Dowling et al. (2003) conducted a study of 206 students enrolled in two different sections of Accounting Information Systems at the University of Tasmania in Australia, taught by the same instructor, one using the traditional format and the other one using the hybrid format. This study aimed to investigate the relationship between student performance, measured by the students' grades on the midterm and final exams, and the following: students' previous performance in three prerequisite courses, age, mode of study and study location. The findings of this study revealed the following:

- The hybrid format was positively related to student performance.
- Previous performance in the prerequisite courses had a significant, positive influence on student performance.
- The students' location and age had a significant, negative relationship with student performance.
- Female students performed better than male students.

Another study was conducted by Sungkyoo et al. (2009) in the US at California State University to investigate the effect of student characteristics (i.e., GPA, age, commuting distance, gender, working hours and marital status) on their performance. The sample was 91 students (54 online and 37 offline) enrolled in online and offline accounting courses, which were supported by the Blackboard system and taught by the same instructor. The researchers divided each group into two subgroups (high GPA (higher than the students' median GPA) and low GPA (lower than the students' median GPA)). The results of this study indicated the following:

- For both groups, student performance, measured by their final test score, was only affected positively by GPA.
- GPA and gender influenced offline student performance more than it did online student performance.

Bradley and Carol (2006) examined student examination performance at the University of Melbourne in relation to the usage of a newly developed online learning system known as *MarlinaLS*™. The participants were enrolled in a second-year undergraduate accounting course. They found a direct relationship between student examination outcomes and usage of the system. They also found that students' prior knowledge was a significant factor in determining student performance, but gender was not found to be a significant factor in determining student outcomes.

2.7 Summary

The review of the literature on factors that affect student performance showed the following strengths:

1. Studies that examined these factors in web-based courses highlighted the importance of learners' personal characteristics, student participation in the online environment, instructor interaction and student perceptions of the effect of the use of technology on student performance.
2. The literature indicated mixed findings regarding the effect of these factors on the performance of learners.

In addition, this chapter addressed the following:

1. The literature indicated that the majority of the studies in the field of web-based courses did not control for essential student characteristics that may affect student performance.

This problem is overcome by using Astin's (1993) I-E-O model, which was developed mainly to control for the differences between student characteristics.

2. Most of the reviewed studies that concentrated on the relationship between environmental factors and student performance lacked a theoretical framework (Merisotis & Phipps, 2001; Thurmond, 2003). This is overcome in the current study by using Astin's (1993) I-E-O model as a guideline for the current study theoretical framework.

The review has also discussed the following:

1. Ways in which Astin's (1993) I-E-O model has been tested and applied in the education literature.
2. The importance of controlling for student characteristics as input variables in investigating the effect of environmental variables on student outcome.
3. The fact that only two studies in the distance education field have applied Astin's (1993) I-E-O model (Thurmond et al., 2002; Thurmond, 2003).
4. The fact that, among student performance measures, students' final grades are considered one of the prime measures.
5. E-learning research in accounting education, as it is the focus of this study.

Chapter Three

Research methodology

3.1 Introduction

Research methodology involves the research design, data collection methods, sampling techniques, fieldwork procedures and data analysis efforts used in an investigation (Zikmund, 2003). Research methodology discusses in detail which methods are used, how and why each method is used. Three methodologies are used in research: qualitative, quantitative and mixed methods. This study aimed to identify factors that may affect student performance in web-based courses. To achieve this goal, the current research used the I-E-O model developed by Astin (1993) to guide its investigative framework. The research methodology used in this study followed the same methodologies used in previous studies that have applied the I-E-O model to maintain continuity. However, the current research employed the mixed-methods methodology, as it consists of two phases; the first one uses a qualitative approach to explore the main factors that might affect student performance in web-based courses. A review of the relevant literature was used to establish a conceptual framework that informed data collection methods, including the construction of group interviews. The I-E-O model and the literature review formed the grounding for identification of the main categories used to analyse the qualitative data. Two models were subsequently developed for testing using the quantitative approach in the second phase.

Research philosophy is discussed in Section 3.2, followed by a discussion of the research approaches in Section 3.3. Section 3.4 presents the research strategy, and then Section 3.5 provides a discussion of the study methods. Accordingly, research design is discussed in Section 3.6. Section 3.7 presents the research ethics. Finally, Section 3.8 summarizes this chapter.

3.2 Research philosophy

Easterby-Smith et al. (2008) highlighted the importance of understanding the research philosophy, as it aids in clarifying the research design, can help the researcher in determining the most effective design and helps the researcher in identifying or developing designs that may be outside her/his prior experience. In general, there are four research philosophy alternatives: postpositivism, constructivism, advocacy/participatory and pragmatism (Creswell, 2009). Postpositivisim represents the thinking beyond positivism, disputing the conventional idea of the unmodified accuracy of knowledge (Phillips and Burbules, 2000). According to this philosophy, researchers must recognize that they cannot be positive in their claims of knowledge when they investigate and study human behaviour and actions (Creswell, 2009).

"Postpositivist assumptions have presented the traditional form of research, and these assumptions hold true more for quantitative research than qualitative research" (Creswell, 2009: 6). The postpositivists hold a deterministic philosophy in which outcomes are determined by causes; thus, there is a need to determine the causes that influence outcomes. In addition, postpositivists tend to reduce ideas into a small set of ideas to test and perform careful observations and measurements of the objective reality that exists in the world. The researcher in this type of research, begins with a theory, gathers data that supports or refutes the theory and then makes necessary revisions before further tests are made (Creswell, 2009). Therefore, postpositivism seeks to explain causal relationships among the variables and link them to a given theory.

Social constructivists assume that individuals seek to understand the world in which they live and work and assume that individuals develop subjective meanings of their experiences that are varied and diverse. This leads the researcher to look for views complexity rather than reducing meanings into a few ideas, so this type of research aims to rely on the views of participants of the studied situation. Thus, inquirers inductively develop a theory or scheme of meaning. Therefore, the social constructivism philosophy advocates the use of qualitative methods, because it focuses on meanings rather than the measurement of social phenomena (Neuman, 2000; Creswell, 2009).

The advocacy and participatory philosophy "is typically seen with qualitative research but it can be a foundation for quantitative research as well" (Creswell, 2009: 9). This type of research is intertwined with a political agenda and considers important social matters such as empowerment and inequality (Kemmis and Wilkinson, 1998)

Pragmatism "arises out of actions, situations, and consequences rather than antecedent conditions (as in postpositivism)" (Creswell, 2009: 10). Pragmatism argues that the research question is the most crucial determinant of the research philosophy adopted. It employs a practical approach, integrating different perspectives to help collect and interpret data (Saunders et al., 2009). Thus, this philosophy underpins mixed-methods research (Saunders et al., 2009). Creswell (2009) cited several justifications for using this philosophy in mixed-methods research. Firstly, there is no commitment to any one system of philosophy, which is compatible with mixed-methods research, in that researchers draw liberally from both quantitative and qualitative assumptions when they engage in their research. Secondly, researchers are free in choosing methods, techniques and procedures of research that enable them to achieve their purposes. Finally, in this philosophy, the researcher uses the possible and available approaches to understand the research problem (Rossman and Wilson, 1985). This applies to mixed-methods research, in that investigators use both qualitative and quantitative data to provide the best understanding of the research problem.

The current research used the mixed methods research design to get a better understanding of the study's problem. Accordingly, this method fits the pragmatism philosophy, as this philosophy supports the mixed-methods research design better than other philosophies (Creswell, 2009; Saunders et al., 2009). The first phase of this research aimed to explore factors that may affect student performance in web-based courses. This helped the researcher to obtain a better understanding of the research problem and discover unexpected features of the subject matter. In order to achieve this, group interviews with students and instructors were conducted at the Hashemite University in Jordan. The second phase of this research focused on applying quantitative methods to test the proposed models based on a theoretical framework (I-E-O) in order to test the relationships between variables (in particular, cause-and-effect relationships). In addition, previous studies in a similar area (I-E-O) have utilized the same quantitative methods as an appropriate way to achieve the required objectives. In this phase, the researcher focused on constructing the study's model, which includes factors that affect student performance. In summary, in the first phase, the researcher focused on meanings to develop a better understanding of the problem (exploratory study). In the second phase, the researcher focused on testing the proposed models to test the relationship between the variables (explanatory study).

3.3 Research approaches

Both deductive and inductive approaches are used in research. The deductive approach uses a logical process that derives a conclusion about a particular instance based on a known general premise or something known to be true (Zikmund, 2003). Hussey and Hussey (1997:19) defined the deductive approach as "a study in which a conceptual and theoretical structure is developed which is then tested by empirical observation; thus particular instances are deduced from general influences”. Hence, in this approach, the research moves from the general to the particular.

Moreover, in the deductive approach, the researcher develops a theory and hypothesis and designs a research strategy to test the hypothesis (Saunders, 2009). Robson (2002) lists five sequential stages through which deductive research will progress:

1. Deducing a hypothesis from the theory

2. Expressing the hypothesis in operational terms, which propose a relationship between two concepts or variables

3. Testing this operational hypothesis

4. Examining the specific outcome of the inquiry (to confirm the theory or indicate the need for its modification)

5. If necessary, modifying the theory in light of the findings

The deductive approach has several important characteristics such as the search to explain causal relationships between variables. Moreover, research that uses this approach uses a highly structured methodology to facilitate replication, which is important to ensure reliability. An additional important characteristic of deduction is that concepts need to be operationalized in a way that enables facts to be measured quantitatively. The final characteristic of this approach is that it helps in generalizing the results statistically by selecting samples of sufficient numerical size (Saunders et al., 2009).

The inductive approach uses a logical process of establishing a general proposition based on observations of particular facts. This approach is defined as “a study in which theory is developed from the observation of empirical reality; thus general inferences are induced from particular instances" (Hussey & Hussey, 1997:13). This is the reverse of the deductive method, since it involves moving from individual observations to statements of general patterns or laws.

In the inductive approach, researchers want to get a feel for what is going on and seek to better understand the nature of the problem. At this point, the researcher starts to collect and analyse the necessary data that ends with the formulation of a theory. In this approach, a small sample size might be more appropriate than the large number used with the deductive approach. Researchers in this tradition are more likely to work with qualitative data and to use a variety of methods to collect these data in order to establish different views of phenomena (Easterby-Smith et al., 2008).

To determine whether the research should be deductive or inductive, Creswell (2009) suggests two important criteria: the emphasis of the research and the nature of the research topic. If a topic is well supported in the literature from which the researcher can define a theoretical framework, it is better to work deductively. On the other hand, with new and controversial topics not well supported in the literature, it is better to work inductively.

In terms of this study, the researcher used the deductive approach for the following three reasons:

1. The current research moves from the general by exploring a broad question in the first phase (i.e., What are the factors that may affect student performance in web-based courses?) to very specific questions in the second phase. These questions were related to the relationship between student perceptions of the interaction activities in web-based courses and their performance while controlling for student characteristics (i.e., Do student perceptions of the interaction of instructors in web-based courses affect their performance? Do student perceptions of the use of technology affect their performance?

Does student participation in the online learning environment affect their performance?). Accordingly, the current research design is closer to the deductive approach.

2. The deductive approach is more appropriate for topics that have a wealth of literature from which the researcher can identify the theoretical framework (Creswell, 2009). This is the case here, as the literature provides a rich source of material about how previous studies have investigated student performance and the main factors that affect it. The researcher applied the deductive approach in the first phase of this study, as this phase aimed to identify factors that may affect student performance in web-based courses and to construct the conceptual framework of the group interviews.
3. One of the main characteristics of the deductive approach is the search to explain causal relationships between variables, which is compatible with the aim of the second (explanatory) phase (i.e., to test the research proposed model by examining the effect of environmental (E) factors on student outcome (O) while controlling for input (I) factors in an explanatory study).

3.4 Research strategy

Different research strategies have been suggested by previous authors (Hussey & Hussey, 1997; Zikmund, 2003; Creswell, 2009;). Creswell (2009:11) called these strategies 'strategies of inquiry' and defined them as "types of qualitative, quantitative, and mixed methods designs or models that provide specific direction for procedures in a research design". Cousin (2009:31) stated, "Qualitative data analysis explores themes, patterns, stories, narrative structure and language within research texts (interview transcripts, field notes, documents, visual data, etc.) in order to interpret meanings and to generate rich depictions of research settings" While quantitative analysis "is used to answer questions about relationships among measurable variables" (Cottrell & McKenzie, 2005:3), mixed-methods approaches to research are those "in which the researcher decides to blend or combine both quantitative and qualitative methods" (Plano Clark et al., 2008:364). Creswell reported the alternative strategies of inquiry associated with quantitative, qualitative and mixed-methods designs as summarized in Table 3.1.

Table 3.1: Alternative strategies of inquiry
Source: Creswell (2009:12)

Creswell (2009) suggests a number of criteria that affect the choice of the ideal strategy. Perhaps the most important of these is the research problem. If the research problem calls for identification of factors that affect an outcome or understanding of the best predictors of outcome, then a quantitative approach is best. On the other hand, if the researcher seeks to understand a concept or phenomenon because little research has been done on it, then a qualitative approach is best.

However, when the research problem cannot be understood using one method, qualitative or quantitative, then it merits a mixed-methods design to gain a better understanding of the research problem. This is the case here, as the researcher in the first phase explores generally to learn what variables to study, then studies these variables with a large sample of individuals in the second phase to test the relationship between variables in a cause-effect relationship.

Table 3.1 presents three strategies of inquiry related to the mixed-methods, sequential mixed-methods, concurrent methods and transformative mixed-methods designs. The sequential mixed-methods strategy aims to expand the findings of one method with another method. This may involve beginning with a qualitative interview for exploratory purposes and following up with a quantitative, survey method with a large sample so that the researcher can generalize results to a population (Creswell, 2009). This is compatible with the current study, as the first phase of this study aimed to explore factors that may affect student performance in web-based courses. To achieve this goal, group interviews with students and instructors were conducted. Then, the results from phase one were used to construct the proposed models in the second phase that were investigated in a large sample by using the survey method (questionnaire) to collect explanatory data.

3.5 Research methods

Research methods "involve the forms of data collection, analysis, and interpretation that researchers propose for their studies" (Creswell, 2009:15). As mentioned earlier, three techniques are used to collect research data: quantitative, qualitative and mixed methods (Kvale, 1996; Morgan, 1997; Kothari, 2004; Creswell, 2009). Creswell (2009:15) reported the major differences between these three methods in collecting the required data, as seen in Table 3.2.

The present research used mixed methods in collecting the research data. Saunders et al. (2009) argued that researchers might wish to employ, for example, interviews at an exploratory stage in order to get a feel for the key issues before using a questionnaire to collect descriptive or explanatory data. This gives the researcher confidence that he or she is addressing the most important issues. This is the case in the current study, as the first phase aimed to identify the main factors that may affect student performance. To achieve this objective, group interviews with students and lecturers were conducted.

Table 3.2: Major differences between quantitative, mixed, and qualitative methods in collecting data
Source: Creswell (2009:15)

Results from the first phase were used to construct the proposed models in the second phase. The survey method was then used to collect data and test the proposed models based on the theoretical framework (I-E-O) in order to test relationships between variables in an explanatory study. Group interviews and questionnaires (mixed methods) were the two data collection methods employed in this research.

Mixed-methods research resides in the middle, because it incorporates elements of both qualitative and quantitative approaches (Creswell, 2009). Plano Clark et al. (2008) cited the following advantages of using mixed methods:

1. The approach helps develop a better understanding of the research problem.
2. The strengths of quantitative (numbers, trends, generalizability) and qualitative (words, context, meaning) approaches offset different weaknesses of the two approaches.
3. The researcher may obtain stronger, more corroborated conclusions when results are derived from two different types of data instead of only a single type.
4. The researcher can use different types of data to examine different aspects of a phenomenon.

5. The approach can be used to achieve a more complete understanding by capturing multiple perspectives.
6. The method produces more persuasive accounts of the phenomenon of interest, because it combines statistical results with qualitative quotes and therefore appeals to a broader audience.

3.5.1 Group interviews

As mentioned earlier, the first phase of the current study, an exploratory study, aimed to explore factors that may affect student performance in web-based courses. Group interviews with students and instructors were employed to achieve this objective. Cooper and Schindler (2008) argued that a study that includes an exploratory element is likely to include research interviews in its design. “The research interview is a specific form of conversation” (Kvale, 1996,:19) that can help the researcher to gather valid and reliable data that are relevant to the research question(s) and objectives (Saunders et al., 2009).

Interviews can be categorized as structured, unstructured or semi-structured, according to level of formality (Corbetta, 2003; Kumar, 2005; Saunders, 2009). Structured interviews “are interviews in which all respondents are asked the same questions with the same wording and in the same sequence” (Corbetta, 2003:269). However, Corbetta (2003:270) stated the following regarding semi-structured interviews: “When conducting a semi-structured interview, the interviewer makes reference to an outline of the topics to be covered during the course of the conversation. The order in which the topics are dealt with and the wording of the questions are left to the interviewer’s discretion. Within each topic, the interviewer is free to conduct the conversation as he thinks fit, to ask the questions he deems appropriate in the words he considers best, to give explanations and ask for clarification if the answer is not clear, to prompt the respondent to elucidate further if necessary and to establish his own style of conversation” .On the other hand, in unstructured interviews, the interviewers have complete freedom in terms of the wording they use and the way they explain questions to respondents (Kumar, 2005). In the current research, the researcher decided to conduct semi-structured interviews with students and lecturers for the following reasons:

1. It was anticipated that the sequence of the interview questions might have differed from interview to interview according to the conversation flow.
2. It was anticipated that the topics covered by the interview questions might have varied from interview to interview; also, some questions might have been omitted.
3. Unprepared questions were asked, and the planned questions were not asked sequentially.
4. The researcher asked for clarification of unclear answers.
5. It was anticipated that additional questions might be required to explore the research questions.

Interviews may be classified as one-to-one (individual interviews) or one-to-many (group interviews), according to the nature of interaction between the researcher and participants (Kvale, 1996; Saunders et al., 2009). One-to-one interviews are conducted between the researcher and a single participant, face-to-face, by telephone or electronically. However, in group interviews, the researcher conducts meetings with a small number of participants to explore an aspect of the research through a group discussion that the researcher facilitates (Kvale, 1996).

The terms ‘focus group’ and ‘group interview’ are often used interchangeably to describe group interviews (Kvale, 1996; Saunders et al., 2009). “Focus group is used to refer to those group interviews where the topic is defined clearly and precisely and there is a focus on enabling and recording interactive discussion between participants" (Saunders et al., 2009:344).There are a number of advantages of group interviews over individual interviews. For example, they allow a breadth of points of view to emerge and for the group to respond to these views. They also help the researcher to explain and explore concepts, as participants in group interviews can generate or respond to a number of ideas and evaluate them. Finally, they can, as in this study, be used to identify key themes that will be used to develop items that are included in a survey questionnaire (Saunders et al., 2009). Additionally, group interviews provide insights when participants challenge others and respond to such challenges (Kruger, 1994). Moreover, they may be used to verify research ideas derived from data gained through other methods and may enhance the reliability of responses (Denscombe, 2000). Group interviews are useful early in a study, as they help the researcher to gain a rapid understanding of key terms or issues of the research. Thus, group interviews were used in the present study to ensure that the researcher had considered as many student issues as possible. Moreover, these data were tested and validated in the second phase of this research on a larger sample.

3.5.2 Questionnaire

As mentioned earlier, the results from phase one were then used to construct the proposed models in the second phase that were investigated in a large sample using the survey method (questionnaire) to collect explanatory data (see section 3.6.2.4.1). The purpose of collecting quantitative data in the second phase in addition to the qualitative data collected in the first phase was to enable the investigator to generalize findings from the qualitative inquiry.

The current study employed the survey method to collect the quantitative data in the second phase for the following reasons:

1. This method is used widely in business and management research.

2. The majority of the studies that used the I-E-O theoretical framework applied the survey strategy to collect the required data.
3. Data collected using the survey approach helps in testing the relationship between variables, which aids in constructing models of these relationships.
4. There is a need to test the study's model on a large sample, as the aim of this study is to construct a model of factors that may affect student performance in web-based courses based on the I-E-O model, which is compatible with the survey method.
5. The survey method is both comparatively easy to explain and to understand (Saunders et al., 2009).

Questionnaires are best used in tandem with the survey strategy. The questionnaire has been defined as "a written list of questions, the answers to which are recorded by respondents" (Kumar, 2005:126). In questionnaires, the respondents are asked to answer the same set of questions. They write down the answers after they read the questions, and interpret what is expected (Kumar, 2005).

There are two types of questionnaires: self-administrated questionnaires and interviewer-administrated questionnaires (Sekaran, 2003; Saunders et al., 2009). Self-administrated questionnaires (e.g., Internet-mediated questionnaires, postal or mail questionnaires and delivery and collection questionnaires) are usually completed by the respondent. Interviewer-administrated questionnaires (e.g., telephone interviews and structured interviews) are recorded by the interviewer based on each respondent's answers. The current study employed self-administrated questionnaires, which were delivered by hand to the students enrolled in two web-based accounting courses and collected directly. This method enabled the researcher to check who had answered the questions (Saunders et al., 2009), established rapport and motivated respondents. It also clarified doubts and increased the response rate to almost 100% (Sekaran, 2003).

3.6 Research design

Research designs “are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis” (Creswell, 2009:3). As discussed earlier, there are three broad types of designs: qualitative, quantitative and mixed methods (Plano Clark et al., 2008; Creswell, 2009). The current study’s design (Figure 3.1) used mixed methods (qualitative and quantitative).

The current research moved from exploring a broad question in the first phase (i.e., What are the factors that may affect student performance in web-based courses?) to very specific questions in the second phase. These questions were related to the relationship between student perceptions of the interaction activities in web-based courses and their performance while controlling for student characteristics (i.e., Do student perceptions of the interaction of instructors in web-based courses affect their performance? Do student perceptions of the use of technology affect their performance? Does student participation in the online learning environment affect their performance?).

Accordingly, the research design of this study embraced an exploratory approach in the first phase and moved to an explanatory approach in the second phase. Using this design developed confidence that the most important issues that affect student performance were taken into consideration. The results from phase one were used to construct the proposed models in the second phase that were investigated on a large sample using the survey method (questionnaire) to collect explanatory data. After collecting the required data, EFA was used as the initial step by summarizing and grouping the number of variables used in the proposed models.

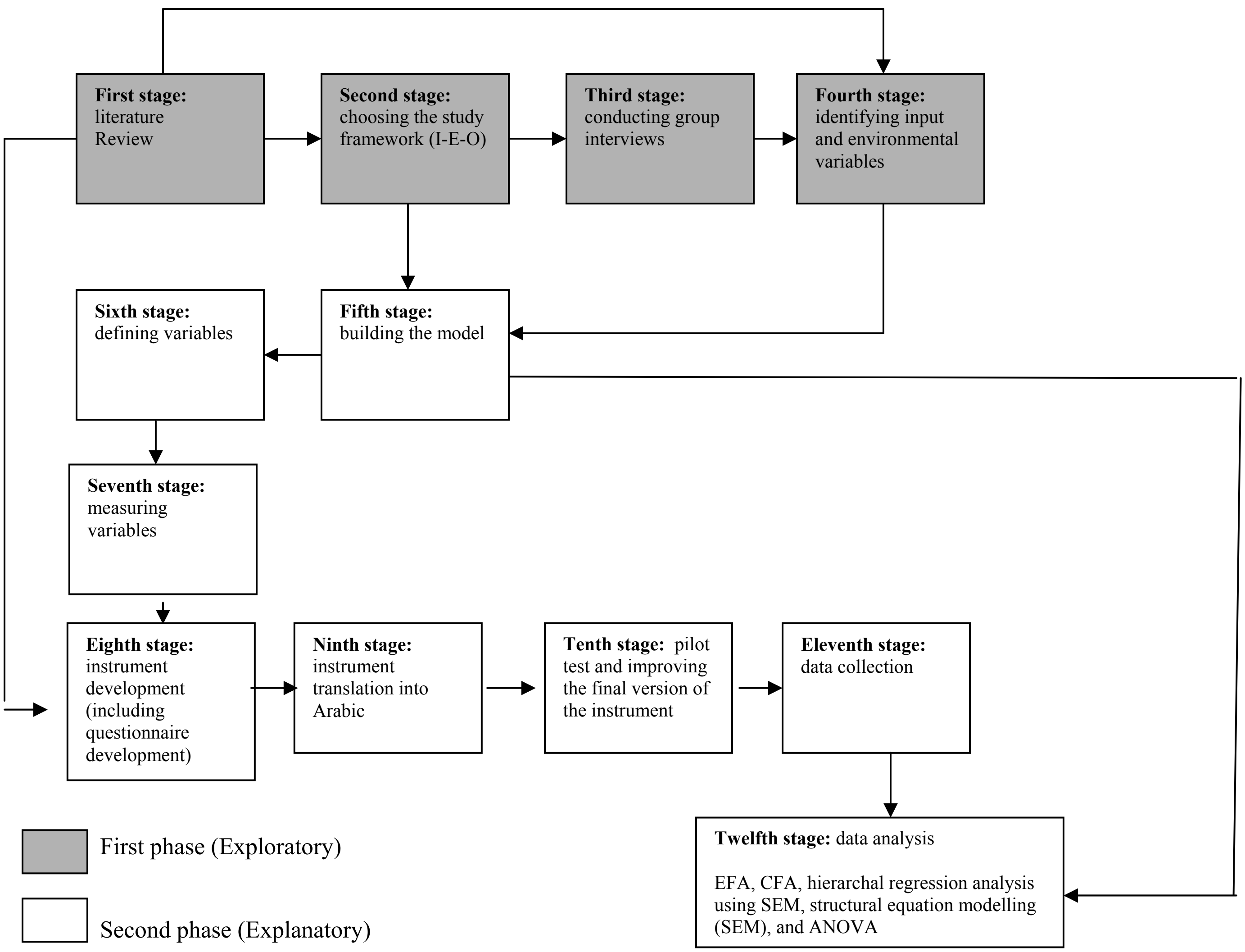


Figure 3.1: Study's design

Based on the results of this stage, the proposed model was refined and contained factors that were extracted from the analysis. Then, CFA was used as a tool to confirm or reject the proposed models. Finally, hierarchical regression analysis using SEM techniques was performed on the structural models to evaluate the hypothesized relationships that investigated student performance in web-based courses. A summary of the outcomes for each stage of the study's design is shown in Table 3.3 followed by an extensive discussion of each stage.

Stage	Outcome(s)
First stage: literature review	- Identifying the theories and models related to the students' outcome. - Identifying factors that may affect student performance in web-based courses and areas for exploration in the group interviews
Second stage: choosing the study's framework	The I-E-O model was selected to guide the current study's framework to investigate factors that may influence student performance in web-based courses.
Third stage: conducting group interviews.	Gathering more detailed information on factors for potential inclusion in the model and establishing their relevance and transferability to the Jordanian context.
Fourth stage: identifying I-E-O variables	The identified factors were classified as input and environmental constructs (factors).
Fifth stage: building the proposed models.	-The identified input and environmental factors were incorporated into the proposed models. - Two models were proposed.
Sixth stage: defining variables	The latent (unobserved) variables were defined clearly in order to measure them.
Seventh stage: measuring variables.	To measure the latent variables a list of indicators was drawn from prior studies identified in the literature.
Eighth stage: developing the instrument.	Development of a questionnaire (the study instrument) that includes all of the identified indicators (questionnaire's items) from the literature.
Ninth stage: instrument translation	The developed questionnaire in the previous stage was translated into Arabic (the native language of the respondents).
Tenth stage: pilot test and improving the final version of the instrument.	A final Arabic version of the study questionnaire was developed after rewording the unclear items and reordering the questionnaire's items.
Eleventh stage: collecting the quantitative data.	Data collected from 473 students enrolled in two web-based Accounting courses.
Twelfth stage: data analysis	**EFA**: eight factors were extracted, and the analysis indicated that these factors differed from one another.
	CFA: the CFA results indicated that the best-fitting measurement model was acceptable for the study models.
	Hierarchical regression analysis using structural equation modelling (SEM): The results indicated that the interaction variables (environmental) accounted for a significant proportion of the performance variance after controlling for the effect of student characteristics (inputs).
	SEM: The results indicated that nine out of twenty three paths were significant.
	Analyses of variance (ANOVAs): the results indicated the effect of some demographic differences on some factors of the study.

Table 3.3: Summary of the outcome for each stage of the study's design

3.6.1 First phase (Exploratory)

The first phase, an exploratory study, aimed to explore the main factors that may affect student performance in web-based courses. Exploratory approaches aim to discover, among other things, new or unexpected distinctions in the subject matter. Plano Clark et al. (2008:377) argued, "The exploratory design's overall intent is based on the need to initially explore a topic qualitatively before an adequate quantitative examination of the topic can be undertaken". The exploratory phase consisted of conducting group interviews with students and lecturers. The group interviews were developed based on a review of the literature and the I-E-O model. Reviewing the literature helped identify evidence that might have supported potential models (frameworks) to guide the research. The I-E-O model aimed to explain how outcomes are influenced by educational practices (Thurmond & Popkess-Vawter, 2001). As seen in Figure 3.1, this phase consisted of four stages; namely, reviewing the literature, choosing the study framework (I-E-O), conducting group interviews and identifying input and environmental variables.

3.6.1.1 First stage: literature review

This stage is very important in developing the study's model, as it provides the researcher with a better understanding of the existing theories and models in the field of student outcome and performance that may support the study's proposed mode. In addition, this stage helps in identify factors that may affect student performance in web-based courses and areas for exploration in group interviews

The outcomes of this stage were as follows:

- Identifying the theories and models related to the students' outcome. In this context three main models were identified and compared; Tinto's model (1975), Pascarella's model (1985), and Astin's (1993) input-environment-outcome (I-E-O) model.

- Identifying factors that may affect student performance in web-based courses and areas for exploration in the group interviews. Accordingly, the main categories for exploration were: computer experience, self-efficacy, prior performance, student attitudes toward web-based learning, motivation, student perception of the interaction of instructors, student perceptions of the use of technology and student participation in the online learning environment.

3.6.1.2 Second stage: choosing the study's framework

After identifying and comparing the main models related to the student outcome in the previous stage the I-E-O model was selected to guide the current study's framework to investigate factors that may influence student performance in web-based courses.

The I-E-O model was mainly developed to control for student characteristics (input differences) so that the relationship between other variables (environment) and student outcome could be investigated accurately (Astin, 1993). The I-E-O model is considered one of the most important approaches in studying college students, in that it investigates how environmental variables mediate input and outcome variables (Zheng et al., 2002). In doing so, this model helps provide researchers with more precise results in investigating factors that may affect student outcomes.

3.6.1.3 Third stage: conducting group interviews

The purpose of group interviewing is to understand "the world from the subjects' points of view" (Kvale, 1996:1), to clarify the meaning of their experiences and to identify key themes that will be used to develop items that are included in the survey. The main categories for exploration in the group interviews were identified based on reviewing the literature and previous applications of the I-E-O model. Accordingly, group interviews with students and instructors at the Hashemite University were used to gather more detailed information on factors for potential inclusion in the model and establish their relevance and transferability to the Jordanian context. Results from the student interviews were used as basis for the interview with instructors as a means of increasing reliability and reducing any bias which may occur from relying on student views alone.

The researcher decided to conduct four group interviews with students (one group from each study level) in order to keep some homogeneity within each group and to encourage student discussion (Krueger, 1994; Kvale, 1996; Litosseliti, 2003). One group interview was conducted with a group of instructors. The group interviews were conducted at the Hashemite University in Jordan. Participants in the study were undergraduate students from each study level, enrolled in courses at the Accounting Department at the Faculty of Economics and Administrative Sciences. All interviews were audio-recorded in order to be used for a further analysis (Kvale, 1996). Participation in these interviews was voluntary. The number of participants in each group ranged between six and seven students (see Chapter Four).

Both quantitative and qualitative coding approaches were used to determine the main factors that may affect student performance, and then the data collected was classified into different categories based on factors collected from the literature and the I-E-O model. A qualitative content analysis was used to identify emerging themes from the interview data in the first (exploratory) phase. Content analysis is "a research method that uses a set of procedures to make valid inferences from a text" (Weber, 1990: 9). This method is frequently used to analyse qualitative data (Morgan, 1997).

3.6.1.4 Fourth stage: identifying I-E-O variables

The I-E-O model contains three main variables (constructs): input, environment and outcome variables. Based on reviewing the literature and previous applications of the I-E-O model, and the group interviews the identified factors were classified as input and environmental constructs (factors). Input factors (student characteristics) include computer experience, self-efficacy, prior performance, student attitudes toward web-based learning, and motivation. Environmental factors were student perception of the interaction of instructors, student perceptions of the use of technology, and student participation in the online learning environment. According to Astin, without controlling for student characteristics (inputs) at the beginning of the learning experience, the causal inferences of the relationship between the practice (environment) and outcomes of education can be incorrect. The current study followed that line of reasoning by controlling for student characteristics while investigating the impact of environmental factors on student performance. Variables can be controlled for through experiments or statistical techniques. In the experimental method, subjects are divided into experimental and comparison groups. Subjects in the two groups must possess the same characteristics that have an expected influence on the dependent variable (e.g., age, gender, GPA etc.) (Powell, 2004). Then, a comparison between the two groups is performed to investigate the effect of a specific condition or situation on the two groups. On the other hand, variables can be statistically controlled by determining the net influence of an independent variable after subtracting the effect of other independent variables (control variables) on the dependent variable (Ragin, 1987). In the current study, input variables (student characteristics) were statistically controlled, because experimental control could not be applied, as the Accounting Department at the Hashemite University (the case of the current study) utilizes web-based learning for all accounting courses, and there are no traditional learning sections. Therefore, students could not be divided into experimental and comparison groups according to the type of learning they received. The statistical control was achieved using hierarchical regression analysis by entering input variables to the study's model before other variables (see Chapter Six). This helps to control for the effect of these variables on student outcome and reduces bias when investigating the effect of other variables on student outcome (Astin, 1993; Thurmond et al., 2002; Thurmond, 2003). The initial entry of input variables helps control for the influence of these variables on student performance, which allows for stronger interpretation of the causal inferences regarding the environmental variables (Astin, 1993). As a result, the estimation of how environmental variables affect student performance would be less biased (Astin, 1993).

3.6.2 Second phase (Explanatory)

The second phase developed the I-E-O model. This phase employed a quantitative method (questionnaire) to test the proposed models based on the theoretical framework (I-E-O) to investigate the relationship between the variables in an explanatory study. The stages of this phase are discussed in the following subsections.

3.6.2.1 Fifth stage: building the proposed models

The identified factors were incorporated into the proposed models as input variables (computer experience, self-efficacy, prior performance, student attitudes toward web-based learning, motivation) and environmental variables related to student perceptions of the interaction activities in web-based courses (student perception of the interaction of instructors, student perceptions of the use of technology and student participation in the online learning environment). In this stage, two models were proposed based on the results of the first phase.

The main difference between the previous two models is the dependent variable. That is, in the first model, the researcher used student performance at the end of the semester, but in the second model, the researcher used change in student performance as the dependent variable. The second model might provide a better understanding of factors that might be able to provide a more complete explanation of the effect of using web-based learning on student performance. This distinguishes this study from other studies that used only student performance (in absolute terms) as the main construct.

3.6.2.2 Sixth stage: defining variables

The proposed models built in the previous stage consists of latent (unobserved) variables, in order to measure these variables they must initially be defined clearly.

According to Astin's I-E-O model, student outcomes are mainly affected by two different variables: input variables and environmental variables. Based on this model and the literature review, the basic themes for each variable were defined as follows:

3.6.2.2.1 Student characteristics (Input variables)

Astin (1993: 18) defines input as "those personal qualities the student brings initially to the educational program". For the purpose of this study, five input variables were investigated: computer experience, self-efficacy, motivation, student attitudes toward web-based learning and prior performance.

Computer experience (CE): Thurmond (2003:79) defines computer experience operationally as "the number of web-based courses a student has taken, perception of computer skills, and knowledge of electronic technology". For the purpose of the current study, the same definition was used.

Self-efficacy (SE): In general, self-efficacy can be defined as "People's judgment of their capabilities to organize and execute courses of action required to attain a designated type of performance" (Bandura, 1986: 391). Compeau and Higgins (1995) argued that self-efficacy is related to an individual's evaluation of his or her ability and confidence to accomplish difficult tasks and overcome obstacles. For the purpose of this study, self-efficacy was defined as the students' evaluation of their confidence, ability and comfort in using the Blackboard system.

Motivation (MO): In general, Roberts and Dyer (2005:14) defined motivation as "the process whereby goal-directed activities are instigated and maintained". Motivation affects how and why people learn as well as their performance (Shih & Gamon, 2001). Sankaran and Bui (2001) argued that motivation reflects the strength of desire and temperament to learn. They also argued that some learn for knowledge while others learn to get a job or a high grade. For the purpose of this study, motivation was defined as the students' desire to perform and learn better and to earn knowledge.

Student attitudes toward web-based learning (SA): To measure this variable, several studies have concentrated on students' feelings of enjoyment in web-based learning and students' evaluations of the attractiveness of web-based learning (Fishbein & Ajzen, 1975; Sankaran et al., 2000; Lim, 2001; Piccoli, 2001; Hammoud et al., 2008; Xie & Ke, 2009). It has also been measured by determining whether learners believe that web-based learning provides new knowledge, saves time and cost and allows freedom of learning (Yu & Yan, 2006). For the purpose of the current study, this factor was defined as the students' evaluations of enjoyment in the web-based courses and their evaluations of the attractiveness of this type of learning. The definition was also based on whether the students believed that web-based learning provides new accounting knowledge, saves time and cost and allows freedom of learning.

Prior performance: Some researchers have measured this factor using students' marks on university entry exams (Mckenzie & Schweltzer, 2001), students' marks on parallel pre-tests (Roberts & Dyer, 2005) or students' grades in prerequisite courses (Dowling et al., 2003). For the purpose of the current study, this factor was measured by the students' marks in a prerequisite course (Accounting II).

3.6.2.2.2 Environmental variables (Student interaction in web-based courses)

Astin (1993:81) stated, "Environment encompasses everything that happens to a student during the course of an educational program that might conceivably influence the outcome under consideration" One of the most important environmental factors in web-based courses that affects student outcome is student interaction in the e-learning environment (Thurmond, 2003). Student interaction in e-learning has been linked to the student perceptions of the interaction of instructors (Soon et al., 2000; Thurmond et al., 2002; Thurmond, 2003; Dennen et al., 2007; Gallien & Oomen-Early, 2008), student perceptions of the use of technology (Billings et al., 2001; Thurmond et al., 2002; Thurmond, 2003) and student participation in the online learning environment (Wang et al., 2001; Coldwell et al., 2008;). Each one of these factors is defined below.

Student perceptions of the interaction of instructors (II): Previous studies have concentrated on two elements of this variable: (1) student perceptions of their instructors' presence in online activities and student perceptions of their instructors' response to their inquiries (Thurmond et al., 2002; Thurmond, 2003; Dennen et al., 2007) and (2) student perceptions of their instructors' timely feedback (Arbaugh, 2002; Thurmond et al., 2002; Thurmond, 2003; Sun et al., 2008) For the purpose of the current study, this variable was defined as student perceptions of their instructors' presence and student perceptions of their timely feedback.

Student perceptions of the use of technology (UT): This factor includes both the availability of the technology infrastructure and the ability of technology to promote the productive use of time. Billing et al. (2001:45) defined a high-quality technology infrastructure as one in which "access to the Internet, course file servers, course software, and learning resources are available and reliable. There is not undue time logging on to the network". In addition, they defined technology that promotes the productive use of time as "hardware and software that are appropriate to support the goals of the course/program; course management software and collaborative learning tools that contribute to the productive use of time and do not cause undue waste of time logging in, sorting messages, retrieving information, or spending time on topics not related to course work." For the purpose of this study, this variable was defined as student perceptions of the availability and reliability of the technology and Internet and the ability of technology to promote the effective use of time.

Student participation in the online learning environment (SP): Different approaches have been used to study student participation in online learning environments, such as the frequency with which the online learning environment is accessed (Picciano, 2002; Davies & Graff, 2005), number of messages posted (Picciano, 2002) and time spent on different e-learning activities (Billings, 2001; Hrastinski, 2006). For the purpose of this study, this factor was defined as the frequency with which the course web-site was accessed and messages were posted to the discussion board as well as time spent working with course content.

3.6.2.2.3 Outcomes

Performance: Picciano (2002:242) made the following argument regarding student performance: Student performance is open to many definitions, successful completion of a course, course withdrawals, grades, added knowledge, and skill building are some of the ways that performance is measured depending upon the content of the course and the nature of the students. Coldwell (2008:20) defined performance operationally as the "overall grade students are awarded at the end of completing the online course". For the purpose of the current study, student performance was defined as the final grade students obtained at the end of the web-based course.

Change in student performance: This factor was defined as the difference between the actual performance (overall grade) at the end of the semester and the predicted performance based on the students' grades in the pre-requisite course (Accounting II).

3.6.2.3 Seventh stage: measuring variables

Given the existence of numerous published articles dealing with the current study's variables, the prior literature represents an important source of content for measure development. The (I-E-O) model consists of a number of constructs (factors), and these constructs are unobservable (latent) variables. Latent variables cannot be measured directly, thus a list of indicators was drawn from prior studies identified in the literature. In this stage, all indicators that could be used to measure constructs are identified, and the previous studies in the same context are used to identify the final list of indicators (see Section 3.6.2.4.).

3.6.2.4 Eighth stage: developing the instrument

The outcome of the previous stage led to the development of a questionnaire (the study instrument) that includes all of the identified indicators (questionnaire's items) from the literature.

3.6.2.4.1 Generating items

The main factors that may affect student performance were identified through the literature review and the group interview. These variables were then defined. Accordingly, the instrument was developed in order to test the study's proposed models. As mentioned earlier, the prior literature represents an important source for developing measures. In addition, Davis (1986) suggested that interviews could be used to elicit items that measure latent variables. Accordingly, the group interviews and the literature review were used to identify the final set of indicators (items) for each variable in this study. Generating items from the literature has two major advantages over direct elicitation. Firstly, there exists a rich set of articles to draw from, many of which have applied a variety of qualitative elicitation as well as quantitative analysis techniques to understand how subjects think about the construct. Secondly, these articles cut across a wide range of user populations (Davis, 1986).

Variable definitions presented previously and in the literature review guided the researcher in selecting which items from the literature to include in the initial pools. The final set of items was identified through the Confirmatory factor analysis (CFA) (see Chapter Six). Table 3.4 shows the sources of the items (indicators) that were used to measure each variable.

Factors	Questionnaire's items (indicators)	Source
Computer experience (CE)	- I would rate my level of computer expertise as….	Picciano (2002)
	- At the beginning of this course, rate your knowledge of how to use the electronic communications technology in this web-based course. - How many web-courses have you taken prior to taking this course?	Thurmond (2002)
Student attitudes toward web-based learning (SA)	- Web-based learning is fun. - Web-based learning provides an attractive learning environment.	Fishbein & Ajzen (1975)
	- Web-based learning helps me to obtain good grades. - I enjoy web-based learning.	Hammoud et al. (2008)
	- Web-based learning provides me with new accounting knowledge. - Web-based learning is an educational method of economic benefit. - Web-based learning saves me time. - Web-based learning allows me to learn freely by using my own time.	Yu & Yan (2006)
Self-efficacy (SE)	- I feel comfortable with the Blackboard system. - I am confident using the Blackboard system even if there is no one around to show me how to do it. - I am confident using the Blackboard system even if I have never used such a system before. - I am confident using the Blackboard system as long as someone shows me how to do it. - I am confident using the Blackboard system as long as I have a lot of time to complete the job for which the software is provided.	Compeau & Higgins (1995)
Motivation (MO)	- I want to get better grades than other students. - Studying appropriately, I can learn the material. - I expect to do well in this class. - I am interested in the content area of this course. - I prefer course material that arouses my curiosity.	Shih & Gamon (2001)
	- I can postpone current enjoyment (for example, watching a game) so that I can study for my test. - I feel I am the person responsible for how well I do in this class. - I am a good time manager and always find the necessary time to study.	Sankaran & Bui (2001)

Student perceptions of the use of technology (UT)	- I waste too much time communicating with others on topics that are not directly related to my coursework. - I waste too much time sorting through my messages to find the few that are useful. - I spend too much time trying to log on to the university's Blackboard system. - I miss important information because the technology does not work correctly.	Billing et al. (2001); Thurmond (2003)
	- I feel the information technologies used in e-learning are very easy to use. - I feel the information technologies used in e-learning have many useful functions. - I feel satisfied with the speed of the Internet.	Sun et al. (2008)
The interaction of instructors (II)	- I receive comments on assignments or examinations for this course in a timely manner.	Sun et al. (2008)
	- My instructor provides extensive feedback. - My instructor provides examples on the course web-site. - My instructor responds to my inquiries. - My instructor establishes synchronous meeting times. - My instructor checks on students' access to course materials. - My instructor checks our e-mails frequently. - My instructor ensures availability of technical support.	Dennen et al. (2007)
Student participation in the online learning environment (SP)	- On average, regardless of whether you posted a message or not, how often did you access the course's website each week? - On average, how often did you post a message to the discussion board each week?	Picciano (2002)
	- On average, how many hours per week have you spent on this course? (Include time spent reading, completing projects and assignments and discussing the course content with the instructor or classmates.)	Thurmond (2003); Billings et al. (2001)

Table 3.4: Items (indicators) of the study's variables

Nevertheless, the questionnaire's items are western developed items; these items were adopted in the current study for the following reasons:

1- These items were adopted from different studies that cut across different populations, environment, and targeted systems.
2- These items have been piloted using students enrolled in the targeted population in order to test its self-efficacy of the concepts, and clarity, to make some modifications if necessary before the full adoption. This process also helped in determining the reliability and validity of the instrument. The result from the pilot study led to the modification of some concepts and indicated that the instrument has acceptable reliability.
3- The questionnaire's items were discussed with two expert researchers in the field of e-learning. The two researchers stated that these items are non-problematic items and can be adopted in the current study.

3.6.2.4.2 Reliability and validity of the instrument

Joppe (2000:1) defines reliability as "The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable". A decision was made to employ a reliability level of 0.8 in the current study (see Chapter Six), as previous studies have indicated that increasing the reliability level above this level is considered a relative waste of time and effort (Nunnally, 1978). This is because "at that level correlations are attenuated very little by measurement error" (Nunnally, 1978:245).

"Validity refers to the issue of whether or not an indicator (or set of indictors) that is devised to gauge a concept really measures the concept" (Bryman & Bell, 2007:165). Different measures of validity (e.g., content, convergent and discriminant validity) have been discussed in the literature. “The content validity of a measuring instrument is the extent to which it provides adequate coverage of the investigative questions guiding the study” (Cooper & Schindler, 2008:290). Therefore, it is the extent to which the measurement questions in the questionnaire provide adequate coverage of the investigative questions. This can be developed in a number of ways, one of which is a careful definition of the research through the literature reviewed and discussion with others (Saunders et al., 2009). This is the case in the current study, as a careful definition of the research’s variables through the literature and the group interviews was used to identify the final set of indicators (items). Davis (1986) stated that generating items from the existing literature is expected to increase the content validity of the resulting measures.

“Convergent validity measures the degree to which the indicators of a latent construct measure the same construct” (Arnold, 2006: 197). Schwab (2005:32) argued, “Convergent validity is present when there is a high correspondence between scores from two or more different measures of the same construct”. “Discriminant validity measures the degree to which two or more latent constructs measure different constructs” (Arnold, 2006:197). A correlation coefficient between latent constructs of 0.85 or more often indicates a lack of discriminant validity (Kline, 2005). The last two measures of validity, convergent and discriminant validity, were employed to deal with sources of measure invalidity.

3.6.2.4.3 Measurement scales

Different scale techniques have been suggested in the literature such as arbitrary scales, differential scales, summated scales (Likert scale), cumulative scales, and factor scales (Kothari, 2004). Table 3.5 summarizes the description of each scaling technique according to Kothari (2004). One of the most frequently used is the Likert scale (Cooper & Schindler, 2008). In the current research, this technique was used, as it provides more homogeneous responses (Burns, 2000) and helps to place individuals or responses in relation to each other with respect to the magnitude of the measuring variable (Kumar, 2005).

Scaling techniques	Description
Arbitrary scaling	Items are selected and developed subjectively by the researcher based on *ad hoc* basis.
Differential scaling	Items are selected and evaluated by a panel of judges.
Likert scaling	Items are evaluated based on its ability to discriminate between respondents with high and low scores
Cumulative scaling	Uses cumulative series of statements on which respondents express their agreement or disagreement.
Factor scaling	Uses factor analysis to develop scales according to the intercorrelations between items.

Table 3.5: Description of scaling techniques

As suggested by the literature, standard scales (seven-point scales) were employed in the current study to meet the reliability and validity criteria. This scale is easier for non-experts (Davis, 1986), and respondents usually avoid extremes (Moser & Kalton, 1971). Likert-type scales were used for forty two items. Thirty-six items had Likert-type responses that ranged from strongly disagree to strongly agree. Six items had categorical responses. One item was used to obtain a measure for each of the following: prior student performance, performance and change in performance. Pre-requisite grades were used as a measure of prior performance. Student performance was measured using final grades at the end of the semester. Finally, the difference between actual performance (overall grade) at the end of the semester and predicted performance based on students' grades in the pre-requisite course was used to measure change in student performance.

3.6.2.5 Ninth stage: instrument translation

The developed questionnaire in the previous stage was translated into Arabic (the native language of the respondents). In order to translate the study instrument, two steps were accomplished:

1. Two professional translators translated the study survey: Dr. Husam Al-Khadash (an associate professor in accounting at the Hashemite University and expert in e-learning research) and Dr. Amjad Abuloum (an associate professor of instructional technology and the former director of the Hashemite University E-learning Office).
2. The two translated versions were compared to resolve any differences.

3.6.2.6 Tenth stage: pilot test and improving the final version of the instrument

The developed Arabic version of the study questionnaire in previous stage was piloted using students enrolled in the Accounting Department at the Hashemite University in Jordan. Pilot testing is a very important phase in this stage, as it allows for testing the efficacy of a proposed concept or concepts, allows for modification prior to full-scale adoption (Lanphear, 2001) and allows for identifying areas that need attention (Schwarz & Sudman, 1995). It also helps in determining the reliability of the instrument and the question sequencing and whether the instrument includes errors or ambiguous items. The results of this stages indicated that some questions were unclear and misunderstood by the respondents, and the sequence of the questions must be reordered. Moreover, it was found that the instrument has acceptable reliability.

Accordingly, a final Arabic version of the study questionnaire was developed after rewording the unclear items and reordering the questionnaire's items.

3.6.2.7 Eleventh stage: collecting the quantitative data

As mentioned earlier group interviews and questionnaires (mixed methods) are the two data collection methods employed in this research. Group interviews with students and instructors have been employed in the first phase of this study in order to explore the main factors that may affect the students' performance in web-based courses. Then a self-administrated questionnaire is used to collect the quantitative data in the second phase in order to collect explanatory data. The questionnaire was administrated by the researcher to encourage students to answer the questionnaire items completely and to explain any misunderstood concepts.

The study questionnaire consisted of three sections. The first section included information about the research and its confidentiality, the second section included questions about student demographics and the last section included questions to measure the study's main variables. The questionnaire was administrated by the researcher to encourage students to answer the questionnaire items completely and to explain any misunderstood concepts. Appendix A and B show the English and the Arabic versions of the questionnaire.

3.6.2.7.1 The study sample

The current study used a convenience sample in that the population of the study was limited to the students enrolled on only two web-based accounting courses from the second level of the study, namely, Intermediate Accounting and Managerial Accounting. Out of 492 who were enrolled in these classes, 473 (96.1%) agreed to participate (259 Intermediate Accounting and 202 Managerial Accounting) (see Chapter Six).

A convenience sample was performed for three reasons. Firstly, these two courses were taught by two active instructors in the online learning environment. Secondly, the Accounting Department at the Hashemite University considered as the first Department that adopted the web-based learning. This makes students at this department the most serious users of the web-based learning. Finally, some studies in the field of e-learning indicated that Accounting and other Business majors are the highest users of the Web to offer their courses (Morris and Rippin, 2002).

3.6.2.8 Twelfth stage: Data analysis

The following statistical techniques were employed to analyse the collected data (see Chapter Six):

1. Exploratory factor analysis (EFA) was used as the first step in determining the latent factors in the questionnaires, and to ensure that all the factors differed from one another. As a result, eight factors were extracted, and the analysis indicated that these factors differed from one another. Accordingly, the eight factors were used for future analysis.
2. Confirmatory factor analysis (CFA) was performed on the hypothesized measurement models. All of the CFA results indicated that the best-fitting measurement model was acceptable for the study models.
3. Hierarchical regression analysis using structural equation modelling (SEM): Based on the CFA results the originated measurement models were incorporated into the SEM analysis. Hierarchical regression analysis was performed on the structural models to evaluate the extent to which student characteristics (inputs) and student perceptions of the interaction in web-based courses (environment) affected student performance and change in performance. The results indicated that the interaction variables (environmental)

accounted for a significant proportion of the performance variance after controlling for the effect of student characteristics (inputs).

4. Structural equation modelling (SEM) was used to revise and examine the proposed models. Then, the path values from conducting SEM were used to test the study hypotheses. The results indicated that nine out of twenty three paths were significant.
5. Analyses of variance (ANOVAs) were used to determine the effect of demographic (e.g., gender, age, ownership of a computer, availability of an Internet connection at home) differences on the factors of the study.

3.7 Research ethics

As this research investigated factors that affect students' performance (final grade) in accounting courses at the Hashemite University, the questionnaire asked for students' IDs so that the researcher could link each questionnaire to each respondent. In order to ensure the confidentiality and security of the research data and to protect the respondents' identities the following were done:

- No one other than the researcher and the supervisory team had access to the questionnaire data; this includes staff of the Hashemite University. Thus there was no way in which data gathered from the questionnaire could be linked to individuals.
- The information linking performance to questionnaire data was destroyed once the data had been collected and coded for analysis. This was achieved by removing the ID data field from the questionnaires.
- The course lecturer was not present when the questionnaire was distributed and collected.
- Collected questionnaires were placed in a sealed envelope in full view of the students.

On the other hand, the identities of individuals and participants were made anonymous through pseudonyms; personal details were not disclosed to anyone else. Interview data and transcripts, including observations reported beyond the researcher's initial notes, were also fully anonymous; names and potentially identifying details were removed and/or replaced with pseudonyms. Transcripts (and equivalent audio) were stored securely in password-protected computer files and locked cabinets only accessible to the researcher.

Moreover, interviews were conducted in a confidential and secure setting. In addition, interviewees were given the opportunity to read the transcripts of their interviews before they were used for research purposes. They were also invited to offer clarifications and make changes. In addition, they were given the opportunity to withdraw themselves from the research at this stage.

3.8 Summary

This chapter explains the various stages of the study and the research ethics. The study included two main phases. The first stage, an exploratory study, aimed to gather the most important factors that may affect student performance in web-based courses; Chapter Four discusses this stage in detail. The research questionnaire was developed in light of this stage. The second stage, an explanatory study, aimed to test the study's proposed model, which was guided by the I-E-O theoretical framework. It employed a number of statistical techniques to achieve the intended aims and objectives. This stage will be discussed in more detail in Chapter Six.

Chapter Four

Factors affecting student performance in web-based courses: Qualitative analysis

4.1 Introduction

This chapter aims to identify the main factors that may affect student performance in web-based courses. Group interviews with students and instructors were used to achieve this goal. Group interviews help elucidate phenomena from the point of view of interviewees (Kvale, 1996). They also provide different opinions and points of view regarding factors that may affect student performance as well as help the researcher to gather suggestions or recommendations raised by participants (Litosseliti, 2003). In the current chapter, the group interview methodology as well as the content analysis method used to analyse these interviews are discussed.

Based on Astin's (1993) I-E-O model and the literature review, the main factors that affect student performance were identified as follows:

1. Student characteristics (input): computer experience, student attitudes toward web-based learning, motivation, self-efficacy, and prior performance.
2. Student perceptions of the interaction activities in web-based courses, which is linked to more than one factor: student perceptions of the interaction of instructors, student participation in the online learning environment and student perceptions of the use of technology.

4.2 Number of group interviews

Previous researchers have indicated that the number of group interviews to be undertaken depends on the research to be followed (Krueger, 1994). This research study aimed to explore a phenomenon for better understanding; in this case, an appropriate number of groups is between four and six (Krueger, 1994; Morgan, 1996). As the purpose of this study was to explore those factors that may affect student performance, it was decided to conduct four groups, one group from each study level, in order to keep some homogeneity within each group and to encourage student discussion (Krueger, 1994; Kvale, 1996; Litosseliti, 2003).

The group interviews were conducted in December of 2008 at the Hashemite University. Participants in the study were undergraduate students from each study level, enrolled in the Accounting Department at the Faculty of Economics and Administrative Sciences. All interviews were audio-recorded in order to be used for a further analysis (Kvale, 1996) and conducted in Arabic.

4.3 Group size

Previous researchers in the field of qualitative data have indicated that group size can range between six and ten (Krueger, 1994; Morgan, 1996), based on the following two arguments:

- A small number of participants will give a better opportunity for each interviewee to raise his/her ideas but will reduce the number of ideas that will be discussed (Krueger, 1994).
- On the other hand, a large number of interviewees will produce diversified ideas and opinions, but it will reduce the chance for each participant to share his/her opinion (Morgan, 1996).

Group size needs to be chosen to reflect a balance between these two considerations. Accordingly, in the current study, the researcher decided to include at least six participants in each group.

A decision was made to run the sessions separately with each study level to keep a minimum level of homogeneity between the students. Lists of the students' names for each year level were taken from the Accounting Department, and then ten students were invited to participate in the interviews. Some of them regretfully declined, and some welcomed the opportunity to join. The final number of participants was 26, because the researcher invited more than six students for each session in case of the absence of some students. Moreover, another group consists of six full-time instructors were interviewed, all of whom had been teaching web-based accounting courses for at least three years at the Hashemite University.

4.4 Description of the interviewed sample

Forty students, ten students from each level, were invited, and 26 students agreed to participate as follows: seven students from the first level, six students from the second level, six students from the third level and seven students from the fourth level, as seen in Table 4.1. The participants' ages ranged from 17 to 22, as seen in Table 4.2.

Gender	**1st Group (1st year level)**	**2nd Group (2nd year level)**	**3rd Group (3rd year level)**	**4th Group (4th year level)**	**Total**
Male	1	2	4	4	11
Female	6	4	2	3	15

Table 4.1: Distribution of participants' gender and level of study

Age	**1st Group**	**2nd Group**	**3rd Group**	**4th Group**	**Total**
17-18	4	1	0	0	5
19-20	3	4	2	1	10
21-22	0	1	4	6	11

Table 4.2: Distribution of participants' age

4.5 Facilitator (Moderator)

In order to reduce any bias that can be caused by the researcher, it maybe preferable that research interviews be conducted by a person other than the researcher (Morgan, 1997). However, in this study, the researcher decided to be the moderator for the following reasons:

- To reduce the possibility of manipulation that could be caused by other moderators (Morgan, 1996). This is firstly because the researcher could better control the critical aspects of the research such as selection of interviewees, question sequencing and development, moderation and analysis (Krueger, 1994). Secondly, the researcher had more than eight years' experience in teaching web-based courses in Jordan and Bahrain. Finally, the researcher knew the objectives of the research and understood the culture and traditions of the participants.
- To improve the consistency over the stages of the research's methodology.

4.6 Data collection

The researcher followed the semi-structured approach in conducting these interviews, because it encourages more discussion. Group interviews start with a general question and move to more specific questions according to the respondents' opinions about the factors that may affect their performance. In addition, the question sequencing was changed according to the interviewees' responses. The interview questions concentrated on the main factors identified from the literature that affect student performance. All group interviews were conducted out of the students' class time. In addition, none of the students knew the researcher, as he is currently working at another university.

4.7 Pilot interviews

In order to plan for the interviews, a pilot test was conducted with five students selected by their instructors from the Accounting Department at the Hashemite University. The pilot helped the researcher to test the efficacy of the interview questions. Accordingly, some questions were modified. The pilot interview also helped the researcher discover some errors in the interview questions. Finally, it helped the researcher to identify the time needed for the interview, which was determined to be at least 30 minutes.

4.8 The questions

The following were the main areas explored:

- Prior computer experience
- The need for prior experience in using the Internet and the system
- Student attitudes toward web-based learning
- Student confidence in web-based courses
- Student motivation
- The timely feedback and interactivity of instructors
- Student interaction with their instructors through the discussion board
- The quality of the Blackboard system and the Internet
- Interactivity of the system
- Frequency of accessing the web-based course
- Frequency of posting messages to the discussion board
- Time spent online

The interviews began with the following general question:

"In your opinion, what are the main factors that may affect your performance in web-based courses?" Then, the discussion moved to the following direct, short and understandable follow-up questions:

1. Tell me about the computer experience needed for web-based learning; does it require any special skills that might affect your performance?
2. What about previous experience in using the Internet? Does it have any effect on your performance? What type of effect?
3. Do you enjoy web-based learning?
4. Does web-based learning help you to get good grades?
5. Do you feel confident in using the Blackboard system?
6. Tell me about things that motivate you in your study, things that improve your learning.
7. Do you expect to do well in your course? Are you enthusiastic about outperforming the other students?
8. Tell me about the effect of instructor feedback and interaction. Does it affect your performance?
9. Do you think your instructor considers this type of learning useful? Why? What is the effect of this on you?
10. Do your instructors encourage you to interact with them and with other students? Do you consider this one of the factors that might affect your performance?
11. Does the availability of qualitative tools in the e-learning system (e.g., digital drop box, discussion forum and e-mails) affect your performance?

12. Tell me about the frequency of accessing the web-site of your courses. Do you spend much time online? Do you think this important to your performance?
13. Do you have any problems accessing the web-sites of your courses from anywhere?
14. Tell me about your interactions with others. What are the topics of your interactions? Do you find them useful? Do they help you achieve better grades?
15. How frequently do you post messages to the discussion board? Does it positively affect your achievement?
16. Can we summarize the factors that may affect your performance?
17. Does this summary seem fair enough? Does it include everything?
18. Would you like to add other factors not discussed here?
19. You are welcome to add any comments you feel should be mentioned in this research.

4.9 Coding and analysing the group interviews

All of the study interviews were conducted in Arabic, which is the first language of the students, researchers and coders. In order to code and analyse these interviews, three steps were followed, as seen in Figure 4.1.

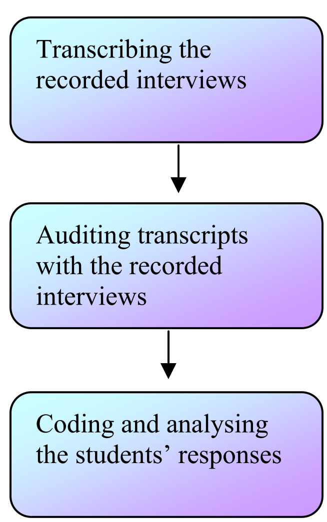


Figure 4.1: Steps of coding and analyzing the study's interviews

Firstly, the recorded interviews were converted to text (Kvale, 1996). Secondly, in order to confirm the reliability and the accuracy of the transcripts, the researcher audited these transcripts with the recorded interviews to make the final texts ready for content analysis. Thirdly, in order to code the students' responses, the interview transcripts were given to two independent coders who were expert in the field of e-learning, and the coding process. In addition, they had conducted several research studies in the same area. To reduce bias in the coding process, these interviews were not coded by the researcher himself. The two coders were given two copies of the interview transcripts in order to code the students' responses and to indicate if there were any differences between them.

Quantitative and qualitative coding approaches were used to determine the main factors that may affect student performance. Quantitative coding was used to identify the items pool or indicators of the latent variables. The qualitative coding approach was used to look for explicit and implicit patterns from the data.

The data collected was classified into different categories that were based on factors collected from the literature and the I-E-O model: student characteristics, student perceptions of the interaction activities in web-based courses, which is linked to the student perceptions of the interaction of instructors, student participation in the online learning environment and student perceptions of the use of technology. Based on the indicators used in the literature (see Chapter Three), a list of codes was given to the coders to explain the categories in greater detail. The coding unit comprised students' responses to the interview questions. The coders added to the list of codes other codes in case they could not classify the interviewee response under any of the given codes. Accordingly, the coders identified the codes by grouping similar themes related to the main categories. Several themes emerged from the analysis of student interview data, which are described in the following sections.

According to Kvale,(1996:208) “Several coders are frequently used for categorization and could be used more often for interpretation of the deeper meanings of the interviews” Moreover, “When different meanings are found by different analysts, they may be worked together into a dialogue leading to an intersubjective agreement” (Kvale, 1996:208). Accordingly, a meeting was held between the coders to resolve any conflict.

4.10 Analysing group interviews

More than one approach could be used to analyse interviews. Saunders et al. (2009) suggested three types of processes in analysing qualitative data: summarising (condensing) of meanings, categorizing (grouping) of meanings and structuring (ordering) of meanings using narrative.

Summarising involves condensing the meaning of large amounts of text into fewer words. Kvale (1996:192) argued that this type of analysis “entails an abridgement of the meanings expressed by the interviewees into shorter formulation”.

Categorization is the process of developing categories and subsequently attaching these categories to meaningful units of data (Saunders et al., 2009). In this type of analysis, “the interview is coded into categories and long statements are reduced to simple categories” (Kvale, 1996:192). Categories may be derived from the data, the theoretical framework (Saunders et al., 2009) or the literature (Strauss & Corbin, 2008).

Narrative structuring “entails the temporal and social organization of a text to bring out its meaning. It focuses on the stories told during an interview and works out their structures and their plots” (Kvale, 1996:192).

In the current research the categorization approach was used to analyze the group interviews, because in this approach, interviews are coded into categories and long statements are reduced to simple categories. These categories were derived from the literature and the I-E-O theoretical framework. Therefore, this approach was more compatible with the current research, as it is concerned with the main factors that affect student performance with the chance of adding, eliminating or modifying the main categories.

Content analysis was used to analyse the qualitative data obtained from the group interviews. This approach has been defined as "a research method that uses a set of procedures to make valid inferences from a text" (Weber, 1990:9). This method is frequently used to analyse qualitative data (Morgan, 1996; Hartman, 2004).

4.11 Findings of the qualitative analysis

Table 4.3 shows the dimensions related to the factors that affect student performance in web-based courses and categories that were identified from the literature. For each category the coders grouped similar themes associated with the main categories in order to identify the codes. The following sections discuss the categories related to each dimension mentioned in Table 4.3.

The interviewees were given anonymous identities in order to provide the reader with information about the respondent. This was done by numbering the four groups from A to D respectively and giving each participant in each group a serial number. For example, A1 represents the first student in the first group, A2 represents the second student in the first group, the third student in the fourth group was labelled D3, and so on for each student.

Dimensions	Categories
Student characteristics (Input)	Computer experience, attitudes, motivation, self efficacy
Student interaction in web-based courses (Environment)	Interaction of instructors, perceptions of the use of technology, student participation in the online environment

Table 4.3: The research dimensions and categories

4.11.1 Student characteristics (Input)

Table 4.4 identifies the codes of the categories related to student characteristics. Table 4.5 presents the students' opinion regarding agreement or disagreement on the importance of each category in affecting their performance.

Categories	Codes
Computer experience	Knowledge of electronic communication, computer expertise in the Internet and Microsoft Office (i.e., Word, Excel, PowerPoint), number of web-based courses taken
Attitudes toward web-based learning	Web-based courses are fun/enjoyable, use an attractive environment, provide new knowledge, save time and money, allow for unrestricted study
Motivation	To perform and learn better and to earn knowledge
Self efficacy	Confidence and comfort

Table 4.4: Categories and codes of the student characteristics dimension

4.11.1.1 Computer experience

The coders classified the words and themes that students used to express their feelings and beliefs about this category into three codes: knowledge of electronic communication, computer expertise in Internet and Microsoft Office (i.e., Word, Excel, PowerPoint) and number of web-based courses taken. Some of the previous studies used these themes as the main indicators to measure the computer experience construct (Thurmond et al., 2002; Thurmond, 2003). Students in the current research referred to these indicators.

Categories	Agree	Disagree	No answer
Computer experience	15	7	4
Attitudes toward web-based learning	19	5	2
Motivation	18	5	3
Self efficacy	17	5	4

Table 4.5: Number of students who identified the students characteristics categories as being important

The majority of students (58%) agreed on the importance of this category to their performance, and only 27% of the students disagreed on the importance of this to their achievement. The majority of first-level students agreed on the importance of this category (six out of seven), but in the last group, only two out of seven agreed on the importance of this factor, and the remaining were distributed between the second group (four out of six) and the third group (three out of six). This might have been because first-level students were having a new experience, but students in the remaining levels thought that anyone could use it without prior experience in computers. This might due to their accumulated experience in using web-based courses.

For instance, a student explained the importance of having some experience in some Microsoft Office programs when he said the following:

"In our web-based courses, you need to be familiar with some Microsoft Office programmes, especially Microsoft Word and Microsoft Excel, because we have to send our assignments

through the digital drop box, so we need to type it first, so definitely if you don't have any knowledge, you will face a major problem in your grades" (A1).

Another student concentrated on the importance of electronic communication skills, saying, *"It is very important to have some knowledge in electronic communication programmes (chatting), because here, we use the discussion board to communicate with our instructor and peers."* (A5)

Another student confirmed that his prior experience in web-based courses helped him interact with others, saying, *"I am now in the second level of my study; I have accumulated a very good experience from the web-based courses taken so that I can use it easily, and I can interact with others without any difficulties."* (B3)

From the previous comments, the researcher concluded the importance of computer experience in this type of learning, which may lead to improved student performance.

On the other hand, one student said, "*I am not expert in using computers, but I am getting satisfactory marks, but indeed it affected my participation negatively.*" (C1) This student disagreed with others on the effect of prior experience in computers on his performance, but he agreed with others on the effect of computer experience on his participation.

Therefore, this category was included in the personal student characteristics that may affect student performance that should be controlled for as input factors (Astin, 1993).

4.11.1.2 Attitudes toward web-based learning

Coders classified the words and themes that students used to express their feelings and beliefs about this category into five codes: web-based courses are fun/enjoyable, use an attractive environment, provide new knowledge, save time and money and allow for unrestricted study.

These themes were the main indicators used by prior studies to measure this category (Fishbein & Ajzen, 1975; Sankaran et al., 2000; Lim, 2001; Piccoli, 2001; Yu & Yan, 2006 Hammoud et al., 2008; Xie & Ke, 2009). Students in the current research focused on these indicators in expressing their attitudes toward web-based courses.

As seen in Table 4.5, 19 out of 26 students agreed on the importance of this factor in their performance. For example, one student said:*”Really, I am enjoying web-based learning, because there are many resources to use, such as PowerPoint slides, lecturer’s notes, solved problems and quizzes. It is a library, with all of these resources. I don’t think there will be any problem to get high marks”.*(D2)

In addition, another student said, *“I am very happy with this type of learning, because it helps me in achieving better grades, because I can find anything I missed during the class time. It is wonderful.”*(D5). Another student said, *“Web-based learning saves a lot of my time; I can get anything in just a few clicks instead of searching in the book. I like it.”*(A6).Therefore, this student had a positive attitude toward web-based learning, because it saves his time.

Another student confirmed the previous positive attitude toward web-based learning by focusing on the freedom of time provided by this type of learning, saying, *“In this type of learning, I am free to choose the best time to learn. I don’t know what to do if it is not available.”*(C4)

This relationship between student performance and attitudes toward web-based learning confirms the findings of prior research studies (Lim, 2001; Piccoli, 2001; Sivo et al., 2007).

Another student linked his attitude and interaction with others, saying, *“Using web-based courses with all of these features is very interesting. I can interact with others any time anywhere through e-mails and the discussion board. In my opinion, it is fun.”*(B6)

On the other hand, a student showed a negative attitude toward the web-based course, saying the following:

"I like to study from books. I find it hard to study from the web; I don't like it at all. Therefore, I don't post any messages on the discussion board; even I don't access the web-site at all. I just tell my friends to print out the material uploaded. Then I study it, and my grades are fine".(A2)

As seen in the previous response, the student linked his attitude (I don't like it) and his interaction (I don't post messages, I don't access the web-site) but added that his grades were not affected. Another student added that his attitude toward this type of learning changed positively because of his instructor's attitude toward the web-based course, saying the following:

"At the beginning, I didn't feel that this type of learning had any usefulness, but our instructor changed this view totally, because he always told us about the great functions of this system, the benefits we could get in comparison with the traditional system. Step by step, I discovered its beauty and improved my grades".(B5)

The response of this student shows a relationship between his attitude and the attitude of his instructor and the manner in which it affected his performance; this relationship is strongly supported in the literature (Hammoud et al., 2008).

4.11.1.3 Motivation

Table 4.5 indicates that out of 26 students, 18 agreed on the importance of this factor in affecting their performance. The majority of the students in the third and fourth levels focused on the importance of this factor, while it was given less weight by first- and second-level students. This might have been because students in the third and fourth levels are more familiar with web-based courses than students in the first two levels.

In the context of this category, the coders classified the themes and words that students used to express their beliefs about this category into two codes; namely, to perform and learn better and to earn knowledge. These themes were used by most of the previous studies as the main indictors to measure student motivation (Sankaran & Bui, 2001; Shih & Gamon, 2001). In addition, the students referred to these indicators.

For example, a student commented, *"I always seek to get better grades than other students."* (C5). Thus, outperforming other students motivated this student. Another student said, *"Thanks to this type of learning, I can understand everything. I am expecting to get higher marks than the other students."*(C2). A student commented, *"I have a thirst for better learning. This type of learning provides me with this opportunity, as it helps me in developing my English language, as it is required to discuss anything in English through the discussion forum."* (D1)

Another student said, *"Web-based learning motivates me to interact more with my instructors and colleagues; also, it encourages me to do some quizzes and extra problems uploaded by the instructor, which influences my grades positively."*(C4). Therefore, this student found that the motivational environment of this type of learning facilitated his interaction with others, which improved his grades.

4.11.1.4 Self-efficacy

Seventeen out of twenty six students agreed on the importance of this category, which supports the findings of more than one prior study regarding the effect of this category on student outcome (Lim, 2001; Wang & Newlin, 2002; Liu et al., 2008). Coders classified the themes and words that students used to express their beliefs about this category into two codes; namely, confidence in using the system and comfort. Most of the previous studies used these themes as the main indicators to measure the construct of student self-efficacy (Compeau & Higgins, 1995). The students' confidence in using the Blackboard system reflects their ability to obtain good grades without any difficulties. For example, a student commented, *"I am very comfortable with the web-based courses. It is easy to do many things in the system, such as downloading the course documents, PowerPoint slides and previous exams; doing quizzes; and interacting with others."* (A6)

Another student said, *"I don't think it is difficult; I don't feel that I am on edge while I am using the system, because I know where to go."* (B6). Indicating the same comment, another student said, *"Usually, our instructors give us a training session at the beginning of each course, so we are familiar and comfortable with using the blackboard system."(B4)*

However, another student said, *"It is difficult to locate the required material due to the high volume of material uploaded."(D6)*

On the other hand, a student said, *"I am not comfortable with this type of learning; I don't use it to interact with others. I prefer to call them rather than sitting in front of the PC to send messages here and there."(A2).* Therefore, this student clearly expressed that his lack of self-efficacy in this type of learning negatively affected his interactions.

4.11.2 Student perceptions of the interaction activities in web-based courses

The questions in the group interviews were related to the main factors associated with student perceptions of the interaction activities in web-based courses, including issues about instructor interaction, perception of the use of technology and student participation in the online learning environment. Table 4.6 summarizes the categories and codes for this dimension. Additionally, the numbers of students who agreed or disagreed that the categories of student interaction in the web-based learning environment affected their performance are summarized in Table 4.7.

Categories	Codes
Student perceptions of the Interaction of instructors	Timely feedback (prompt instructor responses) and interactivity of instructors
Student perceptions of the use of technology	Technology infrastructure (e.g., system's useful functions, Internet speed, accessibility of the network) and the ability of technology to promote the productive use of time
Student participation in the online learning environment	Frequency with which the web-site is accessed, messages posted, time spent online

Table 4.6: Categories and codes of the student perceptions of the interaction dimension

Categories	Agree	Disagree	No answer
Student perceptions of the Interaction of instructors	24	2	0
Student perceptions of the Use of technology	22	3	1
Student participation in the online learning environment	21	5	0

Table 4.7: The number of students who identified the categories of the interaction activities in web-based courses as being important

4.11.2.1 Student perceptions of the interaction of instructors

The coders classified themes and words that students used to express their beliefs about this category into two codes, namely, the timely feedback of instructors and interactivity. Most of the previous studies used these themes as the main indicators to measure the interaction of instructors construct (Dennen et al., 2007; Sun et al., 2008).

Table 4.7 represents the students' agreement and disagreement on the importance of the instructional factors to their performance. The majority of the students agreed on the importance of this factor in affecting their performance in web-based courses. For instance, a student said, *"I* *receive prompt comments from my instructor about my assignments, inquiries and exams, which helps me in getting better grades."*(C2). The findings related to this category have also been highly supported by prior researchers (Pridemore & Klein, 1995; Fredericksen et al., 2000; Dennen et al., 2007; Sun et al., 2008). Another student linked timely feedback and interaction with his instructor, saying, *"When I receive a prompt reply to my inquiries from my instructor, this encourages me to interact with him more and with my colleagues."(A3).* However, another student said, *"I prefer to ask my instructor in class time to have ... direct feedback."(D1)*

On the other hand, a student said, *"Our instructor creates new forums each week to be discussed between us, including him; actually, I got better grades because of this, since the discussion usually relates to our exams, assignments and problems."(A4).* Another student also indicated the following:

"Some instructors announce ... a time at which they will be available online; especially before our exams, they announce dates to answer any inquiries from us. In my case, I never missed that time, because usually, I discover that some ideas were not understood well and that I need some explanation. And who can explain better than my instructor?"(D5).

Another student who had a negative experience with his instructor said, *"One of my instructors does not reply to my inquiries quickly, and sometimes he does not reply at all, so I have to go to his office to get an answer. So what is the usefulness of the online discussion?"*(C6).

4.11.3 Student perceptions of the use of technology

In the context of this category, the coders classified the themes and words that students used to express their beliefs about this category into two codes; namely, technology infrastructure and the ability of technology to promote productive use of time. Previous studies used these themes as the main indictors to measure student perceptions of the use of technology (Thurmond et al., 2002; Thurmond, 2003; Sun et al., 2008).

Table 4.7 represents the students' agreement and disagreement on the importance of this category to their performance. The analysis of student responses revealed that the majority of the students agreed on the importance of this category in affecting their performance.

For instance, a student said, *"The Blackboard system is a very qualitative system due to the useful functions we can get, such as the digital drop box, the discussion board and e-mails. Really, it helps us to achieve better."*(B6). However, another student added the following comment:

"Of course, it provides many functions, but the biggest problem is the Internet speed, either here or at my home. Once, it took me 30 minutes just to download a PowerPoint presentation." (C1). Another student added another comment: *"I don't get any benefit from the interactions with others due to the low Internet speed."* (A2) This student indicated that the Internet quality affected his interactions with others and thus his online participation.

In addition, another student said, *"The university server needs upgrading, because all of us face problems in accessing our courses on the weekends or during rush periods."*(B1). Another student said the following:

"Even at the university, it is not possible to access the web any time. We have a specific period; then you have to leave the lab. Once, I missed five marks in my exam, because I couldn't access the system either at the university or home" (C6).

Some students believed that this type of learning reduced their study time. Others thought that using web-based courses helped them to concentrate on the most important material. For example, a student said the following:

"I believe that the web-based courses helped me … focus more, because you can find PowerPoint slides, lecture notes, extra problems and quizzes, which concentrate on the most important thing, and so it saves a lot of my time, instead of being alone with the textbook".(B2)

On the other hand, another student disagreed, saying, *"Usually, when we log on to the web-sites of our courses, we start to discuss everything except our subject. It is a waste of time."* (C1)

4.11.4 Student participation in the online learning environment

Nineteen out of twenty-six students agreed on the importance of this category in affecting their performance. In the context of this category, the coders classified the themes and words that students used to express their beliefs about this category into three codes: frequency with which the web-site was accessed, messages posted and time spent online. These themes were used by most of the previous studies as the main indictors to measure student interaction in web-based learning (Billings et al., 2001; Picciano, 2002; Thurmond et al., 2003). For example, a student said the following:

"Usually, I spend two to three hours weekly just to go through the materials uploaded on the web-site. I feel it is important to do that, because you need to get benefits from everything there, and you want to understand what was misunderstood". (C4)

On the other hand, another student said, *"I don't think I need to spend too much time on this system. I don't think that if you spend more time online, you will get better marks."* (D3)

Another student supported the previous learner, saying, *"I usually take what I need from the site; then I quickly go back to the book. I usually spend a few minutes."* (C5). Another student seemed to be enthusiastic about this type of learning, which encouraged him to participate by posting messages to the discussion board. He said the following:

"I like to interact with others. This type of learning gives me this opportunity. I post many messages during the course to the discussion forum. It is wonderful to get what you need from your colleagues any time; I think it is one of the main factors that improves my performance".(B5)

One student disagreed with the previous student, saying, *"No matter how many messages you post or read, what matters is the quality of these messages. If they are accurate, you will get high benefits; otherwise, it is a waste of time." (C6)*

Another student added a comment on the frequency with which the web-based course was accessed, saying the following:

"I usually access the course three times or more a week, to check any updates. I don't think any student would not view all the course's documents—especially the PowerPoint presentations, lecture notes and quizzes—because these are the main issue here. If you miss them, you will lose a big portion of your grade".(D2). Another student said, *"I usually access the course frequently, especially to do the quizzes posted, because this … alerted me to the ideas not understood well, which improved my performance a lot."*(A1)

On the other hand, a student disagreed with the previous two students, saying, *"You know, I never access the system. I totally depend on the textbook. If the original is available, it does not make sense to go through these links."*(D3).

4.12 The instructor interviews

All of these categories were discussed with six accounting instructors at the Hashemite University. The discussion was about the importance of these categories to student performance. This discussion began with the following general question:

"From your experience in teaching web-based courses using the Blackboard system, in your opinion, what are the factors that have an influence on student performance?"

Then, the researcher asked each instructor to indicate his belief about the importance of each factor to the student performance by saying whether it is important or not. Accordingly, the researcher ranked these factors as seen in Table 4.8.

Rank	Categories	Number of instructors
1	Technology used	6 out of 6
2	Interaction of the instructor	5 out of 6
3	Student self-efficacy	4 out of 6
3	Student attitudes	4 out of 6
3	Student motivation	4 out of 6
4	Prior performance	3 out of 6
5	Student participation	2 out of 6
6	Computer experience	1 out of 6

Table 4.8: Instructor's ranking of the factors that affect student performance

It is obvious that the instructors ranked factors related to technology first and then factors related to instructors. For instance, an instructor said, *"The main problem the students face in this type of learning is the inability to interact effectively due to the slow speed of the Internet either at the university or at their homes, which I think affects their performance negatively."*

Another instructor highlighted the importance of instructor feedback, saying, *"I noticed that interacting with students and providing them with … quick feedback through the discussion board or e-mails increased their participation, which influenced their performance positively."* This instructor concentrated on interaction and prompt feedback. Another instructor added another comment, saying, "The class size prevents us from interacting effectively."

4.13 Summary

This chapter discussed the qualitative data collected through the semi-structured group interviews with the students and instructors. The categories were identified according to the literature and Astin's (I-E-O) model. The data collected was analysed using the content analysis approach. Accordingly, and based on the literature, the codes were identified and then used to develop the study model based on Astin's (I-E-O) model.

Chapter Five

The proposed models

5.1 Introduction

The main purpose of this chapter is to construct the proposed research models. This chapter is organized into two main phases:

- Phase one aimed to summarise the main factors that may affect student performance. This was achieved through a synthesis of the literature review and group interviews. Then, based on factors identified from the literature, the conceptual framework of the group interviews was designed.
- Phase two aimed to construct the models.

5.2 Literature review

The literature review provided the researcher with a better understanding of the existing theories and models in the field of student outcome and performance that may support the study's proposed model. Accordingly, three main models were identified as potential frameworks: Tinto's model (1975), Pascarella's Model (1985) and Astin's (1993) I-E-O model (see Chapter Two). Reviewing the literature also provided an overall view of how previous studies examined student performance in general and in the accounting field particularly. As well, this stage helped to identify the framework that would guide the study's model to be used in investigating the main factors that may affect student performance in Jordan.

The literature indicated that some studies have found that e-learning has a positive influence on student performance (Agarwal & Day, 1998; Fuchs & Woessmann, 2004; Sosin et al., 2004), whilst others have found a negative effect on student performance or no effect at all

(Navarro & Shoemaker, 1999; Gagne & Shephered, 2001; Brown & Liedholm 2002; Coates et al. 2004; Austin & Skidmore, 2005; Gano & Dellosa, 2007; Pieter 2007) .

Previous studies have indicated that some variables influence learner performance in web-based courses. These studies focused on specific variables such as student characteristics (Wang & Newlin, 2001; Jiang, & Shrader ,2001; Hong , 2002; Dowling, 2003; Erdogan, 2008; Liu et al., 2008,), student perceptions of the interaction activities in web-based courses which has been linked to the student perceptions of the interaction of instructors (Hong , 2002; Thurmond, 2003; Gallien & Oomen, 2008), student perception of the use of technology (Novitzki, 2000; Thurmond, 2003; Webster & Hackly, 1997) and student participation in the online environment (Coldwell et al., 2008). These variables were used to analyse the group interviews.

5.3 The I-E-O model

Astin (1993) argued that the main aim of the I-E-O model is to control for student characteristics (input differences) so that the relationship between other variables (environment) and student outcome can be investigated accurately. This model helps provide researchers with more precise results in investigating factors that affect student outcomes (Astin, 1993).

5.4 Group interviews

Based on the literature review and the I-E-O model, the main categories for exploration in the group interviews were identified: computer experience, self-efficacy, prior performance, student attitudes toward web-based learning and motivation (Input variables). In addition, prior performance was added as an input variable to investigate its relationship with the student performance. Moreover, the following environmental variables were identified: student perceptions of the interaction of instructors, student perceptions of the use of technology and student participation in the online learning environment. All of these variables were included in the proposed models.

5.5 Developing the proposed models

One of the main aims of the first phase of this study was to develop two models based on the I-E-O model in the context of web-based learning. The I-E-O model investigates how environmental variables mediate input and outcome variables (Zheng et al., 2002). The study's first model (Model I) was developed (see Figure 5.1). As seen in Figure 5.1 student characteristics (Input) proposed to have double effects on student performance (Outcome) one that is direct and another one that is indirect through student interaction in web-based courses (Environment).

Several studies have indicated that prior performance plays a major role in predicting future performance (for example, Power, 1987; Mckenzie and Schweltzer, 2001; Dowling et al., 2003). Thus, this study proposes Model II to include the change in student performance as a dependent variable instead of student performance at the end of the semester, as seen in Figure 5.2. Change in performance was measured using the difference between the actual performance (overall grade) at the end of the semester and the predicted performance based on the students' grades in the pre-requisite course (Accounting II).

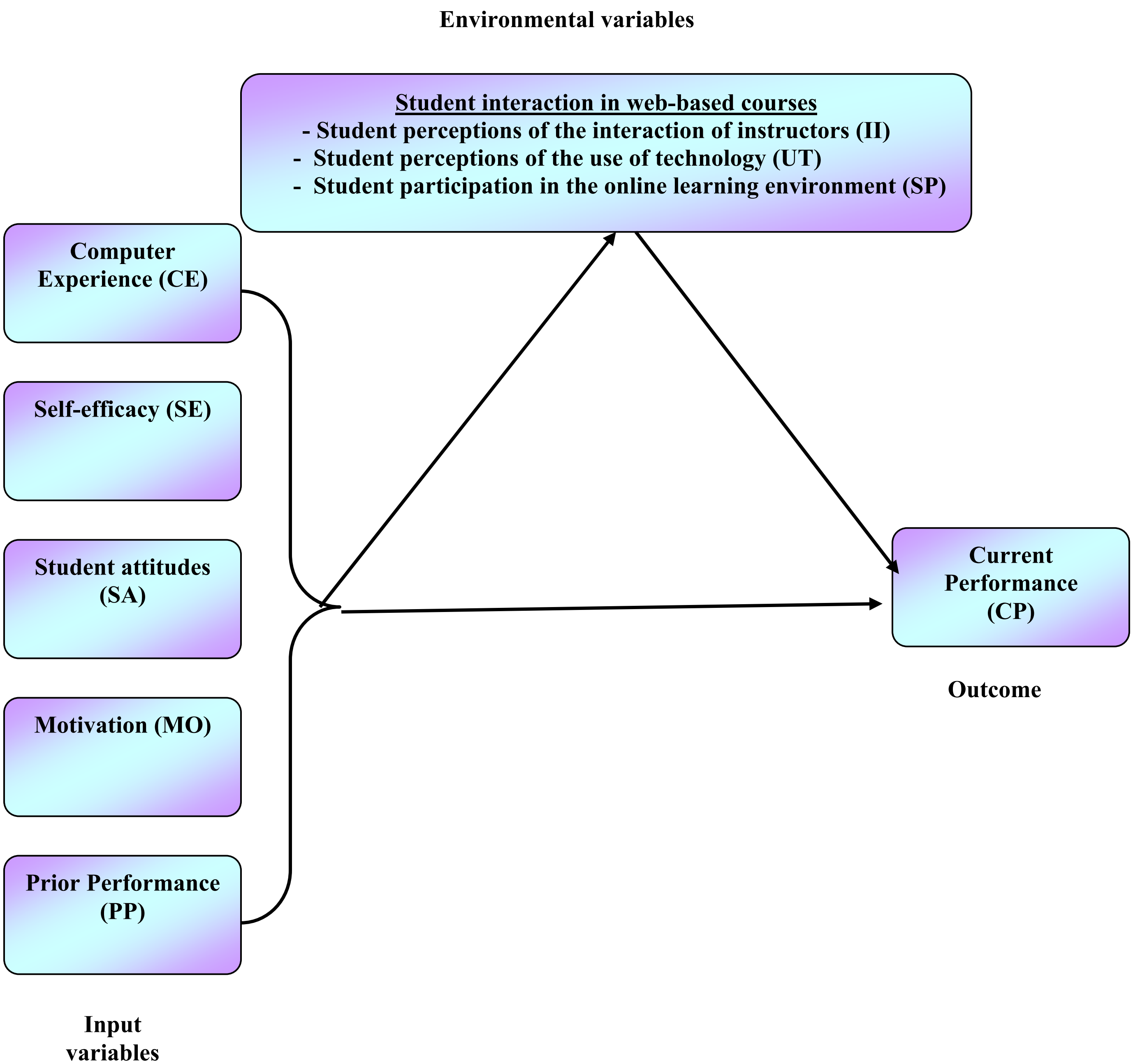


Figure 5.1: Proposed Model I

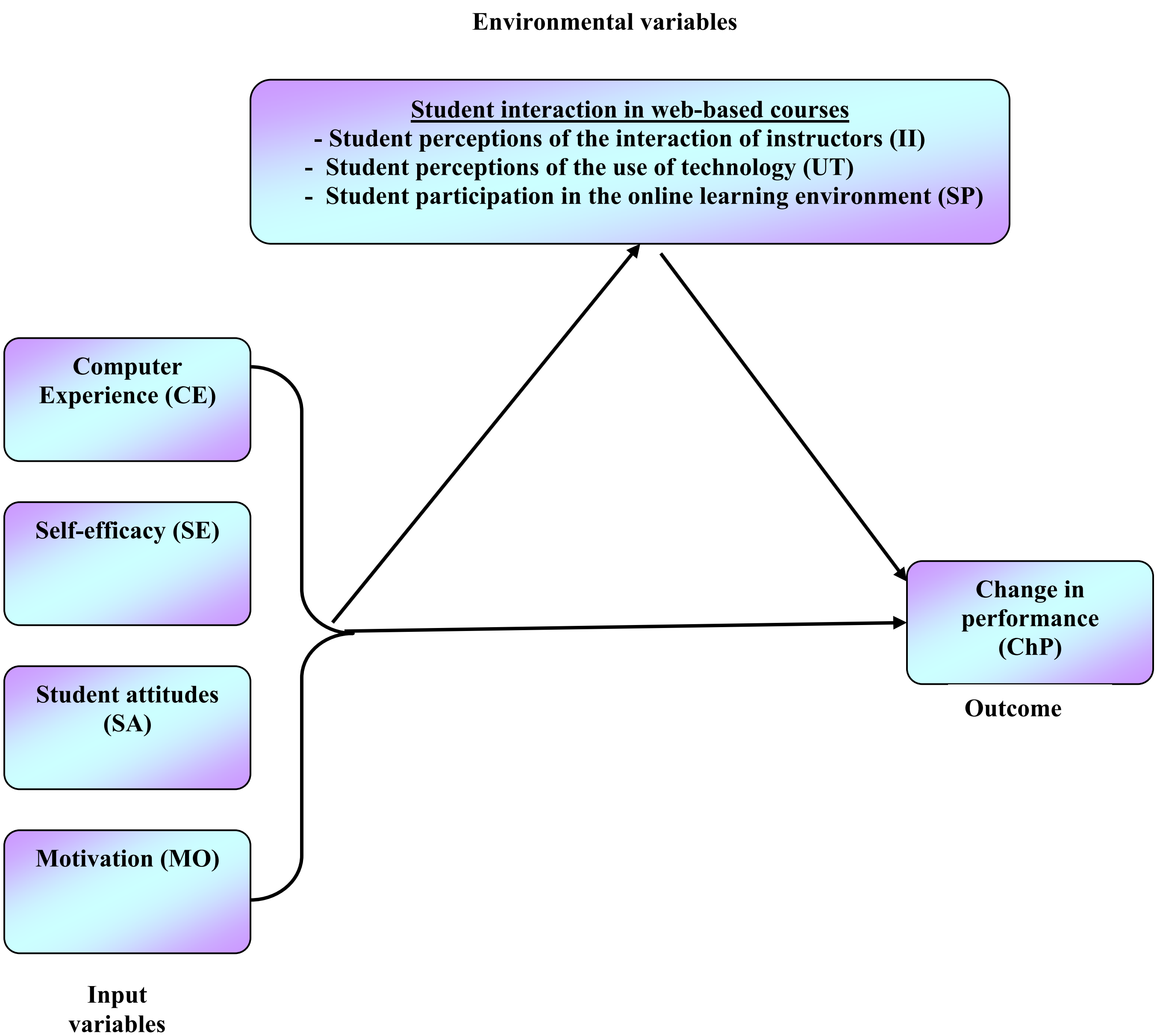


Figure 5.2: Proposed Model II

The main difference between the previous two models is the dependent variable. That is, in the first model, the researcher used student performance at the end of the semester, but in the second model, the researcher used change in student performance as the dependent variable. The second model might provide a better understanding of factors that might be able to provide a more complete explanation of the effect of using web-based learning on student performance, as it concentrates on the change in student performance instead of the final achievement, as in most of the literature. It also controls for student characteristics and prior ability in a subject according to the I-E-O model, which most of the previous studies failed to control for (Thurmond, 2003).

5.6 Research questions

The current research moved from exploring a broad question in the first phase (i.e., What are the factors that may affect student performance in web-based courses?) to very specific questions in the second phase. These questions were related to the relationship between student perceptions of the interaction activities in web-based courses and their performance while controlling for student characteristics (i.e., Do student perceptions of the interaction of instructors in web-based courses affect their performance? Do student perceptions of the use of technology affect their performance? Does student participation in the online learning environment affect their performance?).

5.7 Hypotheses

Based on the research questions, the data was used to assess the statistical significance of relationships as hypothesized. Based on Proposed Model I and Proposed Model II, the reported research hypotheses are as follows:

5.7.1 Hypotheses for Proposed Model I

H1: There is a positive relationship between student perceptions of the interaction of instructors and performance in web-based courses.

H2: There is a positive relationship between student perceptions of the use of technology and performance in web-based courses.

H3: There is a positive relationship between student perceptions of their participation in the online environment and performance in web-based courses.

H4: There is a positive relationship between students' computer experience and interaction in web-based courses.

H5: There is a positive relationship between student motivation and interaction in web-based courses.

H6: There is a positive relationship between student attitudes toward web-based learning and interaction in web-based courses.

H7: There is a positive relationship between prior student performance and current performance in web-based courses.

H8: There is a positive relationship between student self-efficacy and interaction in web-based courses.

H9: There is a positive relationship between students' prior performance and interaction in web-based courses.

H10: There is a positive relationship between students' computer experience and performance in web-based courses.

H11: There is a positive relationship between student self-efficacy and performance in web-based courses.

H12: There is a positive relationship between student attitudes toward web-based learning and performance in web-based courses.

H13: There is a positive a relationship between student motivation and performance in web-based courses.

5.7.2 Hypotheses for Proposed Model II

H14: There is a positive relationship between student perceptions of the interaction of instructors and change in performance in web-based courses.

H15: There is a positive relationship between student perceptions of the use of technology and change in performance in web-based courses.

H16: There is a positive relationship between student perceptions of their participation in the online environment and change in performance in web-based courses.

H17: There is a positive relationship between students' computer experience and change in performance in web-based courses.

H18: There is a positive relationship between student self-efficacy and change in performance in web-based courses.

H19: There is a positive relationship between student attitudes toward web-based learning and change in performance in web-based courses.

H20: There is a positive a relationship between student motivation and change in performance in web-based courses.

Chapter Six presents the testing of the study hypotheses using the path values from conducting the structural equation modelling technique (SEM) on the sample of the current study (see Chapter Six).

5.8 Summary

This chapter summarized the steps followed by the researcher to develop the initial models of factors that affect student performance in web-based courses (Proposed Model I and Proposed Model II) used in this study. The main difference between these two models is the dependent variable; that is, in the first model, the students' final grades at the end of the semester are used, while in the second model, the change in student performance is used. EFA, CFA, hierarchical multiple regression analysis using SEM, and the path values from conducting SEM were then used to test the proposed models as seen in the following chapter.

Chapter Six

Quantitative data analysis

6.1 Introduction

This chapter discusses and analyses the empirical data that was used to test the proposed models and hypotheses presented in Chapter 5. This chapter starts by presenting the results of exploratory factor analysis (EFA), which was used as a data summarization technique to identify the main factors to be used in the study's model. Confirmatory factor analysis (CFA) was then conducted on the hypothesized measurement model. Then, convergent and discriminant validity were assessed after deriving the best-fitting measurement model. After that, hierarchical regression analysis using structural equation modelling (SEM) was performed on the two research models to evaluate the extent to which student characteristics (inputs) and student perceptions of the interaction in web-based courses (environment) affected student performance and change in performance. The proposed structural models were then examined using SEM and the proposed hypotheses were then tested.

In order to determine some demographic differences on the study's factors, a series of analysis of variance (ANOVA) tests was then conducted. Building upon previous related research foundations and the I-E-O model, hypotheses were made regarding student performance and change in performance in web-based courses. Figure 6.1 presents the statistical techniques used in the analyses process.

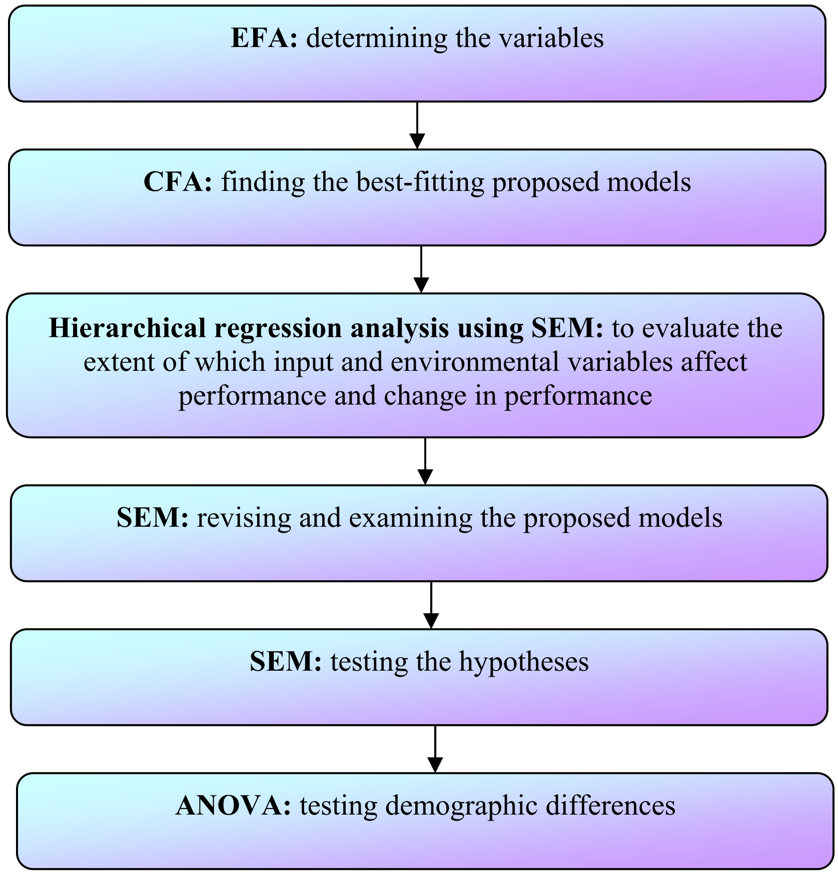


Figure 6.1: Statistical techniques used

6.2 Response rate, non-response bias, and incomplete responses

Participants in the current study were undergraduate students enrolled in two web-based accounting courses (i.e., Managerial Accounting and Intermediate Accounting) at the Hashemite University in Jordan. Participants had the choice to participate in the current study.

Out of 492 who were enrolled in these classes, 473 (96.1%) agreed to participate (259 Intermediate Accounting and 202 Managerial Accounting). Twelve questionnaires with more than 5% of the data missing were identified and deleted. Thus, 461 questionnaires were included in the analysis. The empirical study was conducted in Arabic, as it is the native language in Jordan.

An important issue that may affect the analyses process is the non-response bias. Non-response bias "refers to the mistake one expects to make in estimating a population characteristic based on a sample of survey data in which, due to non-response, certain types of survey respondents are under-represented". (Berg, 2002: 3). The presence of non-response bias might cause a non-representative sample.

In the current study the questionnaires were administrated by the researcher, which were delivered by hand to the students enrolled in two web-based accounting courses and collected directly. Thus, and by following the following strategies the non-response bias was not a problem in the current research:

1- The researcher explained the study's objectives and benefits for the students.
2- The researcher ensure the confidentially of the questionnaire and how these questionnaires will be stored and used in the research (see Chapter Three).
3- The researcher explained any unclear questions for the students.

Moreover, the researcher observed that there were no identifiable common features among the 19 (3.9%) students who refused to participate in the current study as they were males and females, from both courses, and almost in same age. Moreover, it was found that the deleted 12 questionnaires do not have any common patterns among them. Accordingly, there was no reason to believe that non-response bias is an issue in the current research.

6.3 Outliers

Before conducting the analysis process the collected data was tested for the presence of outliers. “Outliers are observations with a unique combination of characteristics identifiable as distinctly different from the other observations”. (Hair et al., 2010:64).

More than one approach is used in order to identify outliers such as variable range check, histogram test, and boxplot tool (Fielding and Gilbert, 2006; Field, 2009; Hair et al., 2010).

1- Variable range check: In this method the researcher checks the numeric variables to identify any outliers that may exist within that range.
2- Histogram test: “is a graphical display of the distribution of a single variable. By forming frequency counts in categories, the shape of the variable’s distribution can be shown”. (Hair et al., 2010:35). In this approach any data out of the tails of the graph represents outliers.
3- Boxplot tool: “is a diagram in SPSS that represents the spread of the data based on the position or order of each data point or case”. (Fielding and Gilbert, 2006:130). In this method extreme cases that are located far away from the box – represents major portion of the distribution- are called outliers.

All of these methods were used to identify outliers in the current study. The results indicated that none of the study observations were identified as being outliers.

6.4 Demographic description of the sample

Table 6.1 shows a summary of the demographic data. Two hundred and fifty female and 211 male students participated. The attendance requirements for the course oblige the students to attend three hours face-to-face per week. The majority of the students (222 or 48.2%) were under

20 years old, as most of the students were fresh graduates from the high school. Two hundred and nineteen (47.5%) of the students were between 20 and 22. The majority of the students were single (94.4%), as they were still young. The students were distributed between two web-based accounting courses: Intermediate Accounting (56.2%) and Managerial Accounting (43.8%). In addition, more than half of the students (53.4%) were not working, a little less than half (44.9%) were part-time workers and the remainder (1.7%) were full-time workers. In terms of computer ownership, the majority of the students (86.1%) owned computers because of the nature of the learning process. The majority of the students who owned computers also had a connection to the Internet (79.4%).

Variable	Frequency	Percentage (%)
Gender:		
Male	211	45.8%
Female	250	54.2%
Age:		
20 and under	222	48.2%
Between 20 and 22	219	47.5%
Between 23 and 25	15	3.3%
Over 25	5	1.1%
Status:		
Single	435	94.4%
Married	26	5.6%
Course		
Intermediate Accounting	259	56.2%
Managerial Accounting	202	43.8%
Occupation		
Not working	246	53.4%
Part-time worker	207	44.9%
Full-time worker	8	1.7%
Computer at home		
Yes	397	86.1%
No	64	13.9%
Internet connection at home		
Yes	366	79.4%
No	95	20.6%

Table 6.1: Demographic data summary

6.5 Factor analysis

Factor analysis "is a multivariate technique for identifying whether the correlations between a set of observed variables stem from their relationship to one or more latent variables in the data, each of which takes the form of a linear model" (Field, 2009: 786).This technique aims to define the underlying structure among the variables in the analysis. It provides the tool for analysing the structure of interrelationships (correlations) among a large number of variables. Factor analysis comprises two types of analysis: EFA and CFA. EFA is used when the researcher aims to reduce and summarize the number of variables and group them into a much smaller number of variables than the original set of variables. On the other hand, CFA is mainly used to understand the relationships between variables.

6.5.1 Factor analysis criteria

Two factors must be considered before conducting factor analysis: sample size and the correlation between variables.

6.5.1.1 Factor analysis criteria: sample Size

The reliability of the factor analysis depends on the sample size. A common rule is to have at least 10-15 participants per variable (Field, 2009). Tabachnick and Fidell (2007) suggest 300 cases as a good sample size for factor analysis. Kass and Tinsley (1979) recommend having between 5 and 10 participants per variable, up to a total of 300. Guadagnoli and Velicer (1988) argue that if a factor has four or more loadings[1] greater than 0.6, then it is reliable regardless of sample size. Furthermore, factors with 10 or more loadings greater than 0.4 are reliable if the sample size is greater than 150. In the current study, the sample used for factor analysis consisted

[1] Factor loadings are " correlation between the original variables and the factors, and the key to understanding the nature of a particular factor" (Hair et al., 2010:92)

of 461 cases, the analysis was conducted on 43 items and the ratio of items to cases was 1:10.7. Therefore, the sample size was considered adequate.

6.5.1.2 Factor analysis criteria: correlation between variables

Appendix (C) shows the cross-correlations among the study's variables. A visual inspection of the cross-correlation matrix indicated that a substantial number of correlations greater than 0.3 and there are no correlations greater than 0.9. This indicated that factor analysis is an appropriate choice of analytical technique and there is no evidence that multicollinearity[2] will prove problematic in interpreting results. (Field , 2009; Hair et al., 2010). It can be noticed that the items of each construct are more correlated with each other than with the items of other constructs, which gives an indication of the existence of a strong relationship with the construct, and so might measure the same factor (Tabachnick and Fidell 2001).

Another method for determining the appropriateness of factor analysis is Bartlett's Test of Sphericity, which examines the correlation matrix for significant correlations among variables. Bartlett's Test of Sphericity should be significant (have a significance value of less than 0.05). In the current research, Bartlett's Test of Sphericity yielded a chi-square value of 11017.394 (903 df, $P < 0.001$) (see Table 6.2). The statistical significance of this test indicated that the correlation matrix has significant correlations among at least some of the variables. (Hair et al., 2010)

Moreover, the SPSS (version 18) output also shows the anti-image correlation matrix (see Appendix D), which is the matrix of the negative values of the partial correlations. The value of the diagonal elements of the anti-image correlation matrix should be above 0.5 for all variables,

[2] Multicollinearity is "a situation in which two or more variables are very closely linearly related" (Field, 2009: 790).

and the off-diagonal elements should be very small (the smaller the better) (Field, 2009). In the current study, the anti-image correlation matrix shows that the diagonal values are all above 0.5, and a substantial number of the off-diagonal correlations in the matrix are very small.

A third measure to examine the intercorrelations among variables to determine the appropriateness of factor analysis is to use the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The KMO statistic varies between 0 and 1, a value greater than 0.5 being acceptable (Kaiser, 1974). Furthermore, values between 0.5 and 0.7 are moderate, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb (Hutcheson & Sofroniou, 1999). In the current study, the KMO value was 0.838 (Table 6.2), giving an indication of the existence of a small correlation among variables.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.838
Bartlett's Test of Sphericity	Approx. Chi-Square	11017.394
	df	903
	Sig.	.000

Table 6.2: KMO and Bartlett's Test

6.5.2 Techniques of factor analysis

As mentioned earlier, factor analysis consists of two important techniques: EFA and CFA. EFA provides two interrelated, distinct outcomes: data summarization and data reduction. In data summarization, factor analysis derives an underlying dimension that, when interpreted and understood, describes the data using a much smaller number of concepts than the original individual values. Thus, what is required for the analysis is the estimation of the factors and its loadings (contribution of each variable to the factor). "Data reduction relies on the factor loading as well, but uses them as the basis for either identifying variables for subsequent analysis with other techniques or making estimates of the factors themselves (factor scores), which then replace the original variables in subsequent analyses" (Hair et al., 2010:99). In the current research, EFA was used as the initial step in order to summarize and group the number of variables used in the proposed models. The second step involved using CFA to confirm or reject the proposed models.

6.5.2.1 Exploratory factor analysis (EFA)

EFA was used as a first step to ensure that all the factors differed from one another. Principal component analysis (PCA) was conducted on 43 items with orthogonal rotation (VARIMAX). PCA was used as an attempt to reconstruct eight composite factors. When interpreting the rotated factor pattern, an item was considered to load on a factor if the factor loading was 0.4 or more (Nunnally, 1974). This criterion was used to examine the rotated pattern matrix for items that did not load on a factor with other items from the same scale (1-7). The PCA showed that eight factors were extracted (See Appendix E). All factor loadings were larger than 0.4, and there were no cross loadings on multiple factors.

After identifying the significant loadings the next step is to determine any variables that are not accounted for accurately by the factor. This can be done using two methods. Firstly, by checking the factor loading to determine any variable that has no significant loading. Secondly, by testing the variable's communality (Hair et al., 2010). Communality "is the proportion of a variable's variance that is common variance. This term is used primarily in factor analysis. A variable that has no unique variance (or random variance) would have a communality of 1, whereas a variable that shares none of the variance with any other variable would have a communality of 0" (Field, 2009:783). As seen in Appendix (E) all variables loadings were above the recommended 0.4 for interpretative value (Hair et al., 2010). Table 6.3 represents the communality values for all variables. Kaiser (1974) recommended a value of 0.7 as an acceptable communality, or when the sample size is greater than 250 the average communality should be grater than 0.6 to consider communalities satisfactory. As seen in Table 6.3 a number of variables are shown with communalities more than 0.7 and the average communality (computed by adding them up and dividing by the number of communalities) is 0.612 which is greater than the acceptable average 0.6 recommended by Kaiser (1974). Therefore, all of these variables were retained for further analysis.

An exact quantitative basis for deciding the number of factors to extract has not been developed for stopping factoring (number of factors to extract). However, the most commonly used technique for extracting factors is the latent root criterion (Hair et al., 2010). In this technique, only factors having eigenvalues greater than 1 are considered significant; all factors with latent roots less than 1 are considered insignificant. Using the eigenvalue for establishing a cut-off is most reliable when the number of variables is between 20 and 50 (Hair et al., 2010). This technique was used for extracting factors in the current study.

Variable	Communality	Variable	Communality
SP1	.596	MO4	.805
SP2	.730	MO5	.739
SP3	.699	MO6	.774
CE1	.679	MO7	.341
CE2	.727	MO8	.830
CE3	.614	UT1	.832
SA1	.676	UT2	.314
SA2	.472	UT3	.244
SA3	.736	UT4	.294
SA4	.593	UT5	.680
SA5	.725	UT6	.368
SA6	.710	UT7	.356
SA7	.704	II1	.513
SA8	.710	II2	.738
SE1	.541	II3	.724
SE2	.703	II4	.699
SE3	.464	II5	.630
SE4	.555	II6	.395
SE5	.438	II7	.680
MO1	.565	II8	.463
MO2	.883	PP	.697
MO3	.713		

Table 6.3: Communalities

Accordingly, the PCA revealed the presence of eight factors with eigenvalues exceeding 1, and the cumulative variance explained was 61.28% (See Appendix F). As a result, eight factors were extracted, and the analysis indicated that these factors differed from one another. Accordingly, the eight factors were used for future analysis.

Five factors (computer experience, student attitudes toward web-based learning, self-efficacy, motivation and prior performance) were entered into the I-E-O model as input variables. Three factors related to student interaction in the web-based environment (student participation in the web-based learning environment, student perceptions of the interaction of instructors, and student perceptions of the use of technology) were entered as environmental variables. In addition, the students' final grades at the end of the semester (student performance) were entered as the outcome variable.

6.5.2.2 Confirmatory factor analysis (CFA)

"The purpose of CFA is to identify latent factors that account for the variation and covariation among a set of indicators" (Brown, 2006: 40). Both EFA and CFA aim to produce the observed relationships among a group of indicators with a smaller set of latent variables. However, they differ fundamentally by the number and the nature of a priori specifications and restrictions made on the factor model. That is, in EFA, no specifications are made concerning the number of latent factors, but in CFA, the number of factors is ex ante specified by the researcher. Moreover, unlike EFA, CFA requires a strong empirical or conceptual foundation to guide the factor model. Another difference between the two techniques is that EFA may be used as an exploratory first step during the development of a measure, but CFA can be used as a second step to examine whether the structure identified in the EFA works in a new sample. Accordingly, CFA can be used to confirm the factor structure identified in EFA (Harrington, 2008). In a sense, CFA is a tool that enables us to either confirm or reject our preconceived theory (Hair et al., 2010).

CFA was performed on the hypothesized measurement models (Models I and II). Modifications on the measurement models were performed building upon the general guidelines suggested by MacCallum (1986), Anderson and Gerbing (1988), Segars and Grover (1993), Segars (1997), and Byrne (1998). They suggested that, generally, the modification indices and standardized residuals be analysed and modifications be made one at a time, since a single change might affect other parts of the solution (Abbad, 2009). The initial measurement model met the four criteria suggested by Bollen (1998); that is, the factors were correlated, each observed variable was determined by one latent variable, each latent variable had at least two indicators, and measurement errors were uncorrected.

Several fit indices were used in the current study to test how well the data fit the study's model namely, the ratio of chi-square (χ^2)[3] to degrees of freedom[4] (χ^2/df), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). These indices are discussed below.

1- The ratio of χ^2 to degrees of freedom (χ^2/df):

This value is computed by dividing the χ^2 value by the degrees of freedom. This would overcome the sensitivity of χ^2 to the sample size. This value should exceed 3 as maximum cut-off value (Chin and Todd, 1995; Kline, 2005; Hair et al., 2010).

2- Goodness of fit index (GFI):

This fit index is also less sensitive to the sample size. According to Hair et al., (2010) this index measures the ratio of the minimum fit function (F_k) to the fit function that would result if all parameters were zero (F_0) (indicates that nothing is related to each other and there are no theoretical relationships) as seen in the equation below if this ratio is quite small this means that the model fits well otherwise, it does not.

$$\text{GFI} = 1- (F_k / F_0)$$

[3] Chi-square (χ^2)" is a statistical measure of difference used to compare the observed and estimated covariance matrices" (Hair et al., 2010:630)
[4] Degree of freedom represents the amount of mathematical data available to estimate the parameters of a model.

GFI values range between 0 and 1. Zero represents the failure of the model to explain any covariance between the measured variables. In this case (F_k / F_0) ratio would equal 1 and so GFI would be 0. Therefore, the higher the value of GFI indicates better fit. A value that is higher than 0.9 is recommended to consider this value a satisfactory one (Segars and Grover ,1993; Kline,2005; Hair et al., 2010).

3- Adjusted goodness of fit index (AGFI)

This index adjusts GFI by a ratio of the degrees of freedom used in a model to the total degrees of freedom available. By doing so the model complexity would be taken into account (Hair at al., 2010). A GFI value that is greater than 0.8 is considered acceptable (Segar and Grover, 1993; Hu et al., 1999).

4- Normed fit index (NFI)

NFI measures the ratio of the differences in the χ^2 value for the fitted model and the null model[5] divided by χ^2 value for the null model. By doing so it will help in assessing how well the specified model fits relative to a null model. Tate (1998) suggested a value that is greater than 0.9 to be considered acceptable value for NFI.

5- Comparative fit index (CFI)

CFI is an improved version of NFI. CFI value ranges between 0 and 1. This index considered one of the widely used indices as it suitable for complicated models (Hair et al., 2010). A value that is higher than 0.90 was suggested to consider a model is well fitted (Kelloway , 1998; Hair at al., 2010).

6- Root mean square error of approximation (RMSEA)

This measure is used widely because it is not affected by a large sample or a large number of observed variables. Therefore, this measure indicates how well a model fits not only

[5] Null model assumes no correlations among all observed variables.

the sample but also the whole population (Hair et al., 2010). This measure can be calculated using the following equation

$$\text{RMSEA} = \sqrt{(\chi2 - df) / (N-1)}$$

Where

$\chi 2$: Chi-square.

df: degrees of freedom.

N: sample size.

A value that is between 0.03 and 0.08 is considered acceptable for good fit. Table 6.4 shows the recommended cut-off value for each one of the discussed indices.

Index	**Recommended cut-off value**	**Recommended by**
The ratio of chi-square to degrees of freedom (χ^2/df)	≤ 3.00	Chin and Todd (1995); Kline (2005); Hair et al., (2010)
Goodness of fit index (GFI)	> 0.90	Segars and Grover (1993); Kline (2005); Hair et al., (2010)
Adjusted goodness of fit index (AGFI)	> 0.80	Segar and Grover (1993); Hu et al., (1999).
Normed fit index (NFI)	> 0.90	Tate (1998)
Comparative fit index (CFI)	> 0.90	Kelloway (1998); Hair at al., (2010)
Root mean square error of approximation (RMSEA)	0.03- 0.08	Hair et al., (2010)

Table 6.4: Recommended cut-off values for fit indices

The results shown in Table 6.5 for the initial measurement model indicated a poor model fit. χ^2/df (2.097) was within the acceptable level (<3), but the other measurement model indices indicated a poor model fit. GFI (0.85) and NFI (0.826) were below the acceptable level of 0.9.

In order to derive an acceptable model fit some modifications were performed on the measurement model. The modification indices (an output from AMOS[6]); suggested several items had large standardized residuals (more than 3) and/or were indicated to be loaded with multiple

[6] AMOS (Analysis of Moment Structure) is among the first SEM programmes to simplify the interface. AMOS 18 was used in the current research. Another specialized software package used is LISREL (Linear Structural Relations)

factors. Each of these items was deleted one at a time, and the study's model was subsequently re-evaluated. The general order of item deletion started with the item having the most factors loaded. Accordingly, measurement model with acceptable model fit was derived from these modifications for both models.

Model Goodness-fit indexes	Recommended Value	Initial model	Result model I	Result model II
Chi-square		1836.854	416.562	403.207
Degree of freedom		876	241	225
Chi-square (χ^2)/df	≤ 3.00	2.097	1.728	1.792
Goodness-of-fit index (GFI)	> 0.90	0.850	0.932	0.931
Adjusted goodness-of fit index (AGFI)	> 0.80	.830	0.909	0.909
Normed fit index (NFI)	> 0.90	0.826	0.919	0.909
Comparative fit index (CFI)	> 0.90	0.9	0.964	0.957
Root mean square error of approximation (RMSEA)	≤ 0.08	0.049	0.040	0.041

Table 6.5: CFA statistics of model fit

Nineteen items were deleted from the original measurement items (See Table 6.6). As a result of deleting these items, AMOS output showed a good model fit for both models (see Table 6.5). Chi-square/df decreased to 1.728 and 1.792 for the first and the second models, respectively. RMSEA was 0.04 for the first model and 0.041 for the second model, which is less than the recommended value (0.08). GFI (0.932, 0.931), NFI (0.919, 0.909) and CFI (0.909, 0.957) were all above the acceptable level of 0.9, and AGFI (0.909, 0.909) was above the 0.80 recommended value.

Factor	Variable	Description
Self-efficacy (SE)	SE1	I feel comfortable with the Blackboard system.
	SE2	**I am confident using the Blackboard system even if there is no one around to show me how to do it.**
	SE3	**I am confident using the Blackboard system even if I have never used such a system before.**
	SE4	I am confident using the Blackboard system as long as someone shows me how to do it.
	SE5	**I am confident using the Blackboard system as long as I have a lot of time to complete the job for which the software is provided.**
Student Attitudes (SA)	SA1	Web-based learning is fun.
	SA2	Web-based learning provides an attractive learning environment.
	SA3	**Web-based learning helps me to obtain good grades.**
	SA4	**I enjoy web-based learning.**
	SA5	Web-based learning provides me with new accounting knowledge.
	SA6	Web-based learning is an educational method of economic benefit.
	SA7	**Web-based learning saves me time.**
	SA8	Web-based learning allows me to learn freely by using my own time.
Motivation (MO)	MO1	I want to get better grades than other students.
	MO2	Studying appropriately, I can learn the material.
	MO3	**I expect to do well in this class.**
	MO4	**I am interested in the content area of this course.**
	MO5	**I prefer course material that arouses my curiosity.**
	MO6	I can postpone current enjoyment (for example, watching a game) so that I can study for my test.
	MO7	I feel I am the person responsible for how well I do in this class.
	MO8	I am a good time manager and always find the necessary time to study.
Computer Experience (CE)	**CE1**	**I would rate my level of computer expertise as….**
	CE2	**At the beginning of this course, rate your knowledge of how to use the electronic communications technology in this web-based course.**
	CE3	How many web-courses have you taken prior to taking this course?
Perception of the use of technology (UT)	**UT1**	**I waste too much time communicating with others on topics that are not directly related to my coursework.**
	UT2	**I waste too much time sorting through my messages to find the few that are useful.**
	UT3	I spend too much time trying to log on to the university's Blackboard system.

	UT4	I miss important information because the technology does not work correctly.
	UT5	I feel the information technologies used in e-learning are very easy to use.
	UT6	**I feel the information technologies used in e-learning have many useful functions.**
	UT7	**I feel satisfied with the speed of the Internet.**
Student Participation (SP)	**SP1**	**On average, regardless of whether you posted a message or not, how often did you access the course's website each week?**
	SP2	**On average, how often did you post a message to the discussion board each week?**
	SP3	**On average, how many hours per week have you spent for this course? (Include time spent reading, completing projects and assignments, and discussing the course content with the instructor or classmate.)**
Student Perceptions of the interaction of instructors (II)	**II1**	**I receive comments on assignments or examinations for this course in a timely manner.**
	II2	**My instructor provides extensive feedback.**
	II3	My instructor provides examples on the course web-site.
	II4	My instructor responds to my inquiries.
	II5	**My instructor establishes synchronous meeting times.**
	II 6	**My instructor checks on students' access to course materials.**
	II7	My instructor checks our e-mails frequently.
	II 8	**My instructor ensures the availability of technical support.**

Note: observed variables retained after the modification indices are in bold

Table 6.6: Eliminated and retained items of the study's variables

6.6 Validity and reliability analysis

After estimating and testing the measurement model and deriving the best-fitting model, the model's validity was assessed. Validity "is the extent to which a scale or set of measures accurately represents the concept of interest" (Hair et al., 2010: 126). The study examined both convergent and discriminant validity. Convergent validity and discriminant validity involve the evaluation of measures against each other instead of against an external criterion (Kline, 2005). Convergent validity assesses the degree of correlation between two measures of the same concept (Solberg, 2006). Sloberg argued that convergent validity exists when a set of indicators that measures the same construct have intercorrelations that are at least moderate in magnitude. Therefore, it would be anticipated to have high loading on the same factor (Kline, 2005). Hair et al., (2010:126) defined discriminant validity as "the degree to which two conceptually similar concepts are distinct". They also said that "high discriminant validity provides evidence that a construct is unique and captures some phenomena other measures do not" (ibid:710).

6.6.1 Convergent validity

In order to assess convergent validity, Fornell and Larcker (1981) suggested three measures: item reliability, construct (composite) reliability and average variance extracted (AVE). "Item reliability refers to the amount of variance in an item explained by the underlying construct rather than by error" (Abbad, 2008:173). For the assessment of individual item reliability, the loadings (or simple correlations) of the measures on their construct should be at least 0.7. This implies that there is more shared variance between the construct and its measures than error variance. This indicates that more than 50% of the variance in the item (the square of loading) is due to the construct (Huth, 2008). Accordingly, if an item reliability is greater than 0.5 and has a significant t-value this would be an evidence on the existence of convergent validity for this item (Fornell & Larcker, 1981). Table 6.7 presents the convergent validity test and reliability analysis. All items' factor standardized loadings ranging from 0.707 to 0.957 were significant and greater than the recommended cut-off minimum factor loading of 0.707 (Gefen et al., 2000). All items' reliability values (R^2) were above the recommended value of 0.5 except one item, which had a value of exactly 0.5. However, this was considered acceptable, because the other items measuring the same construct had higher reliability scores (Huth, 2008). The values of R^2 imply that the model can be explained. R^2 was computed by squaring the standardized loading for each variable. For example squared standardized loading (R^2) for SE2 (0.711) is 0.506 which implies that SE factor explains 50.6 percent of the variation in SE2 and the remaining percentage represents the error variance.

Construct (composite) reliability, the analog of Cronbach's α is a measure of reliability and internal consistency of the measured variables representing a latent variable. Composite reliability (CR) is calculated according to Hair et al., (2010) using the following equation:

$$\frac{\text{(Squared sum of factor loadings)}}{\text{(Squared sum of factor loadings)} + \text{(Sum of error variance)}}$$

Error variance = $1 - R^2$

For example composite reliability for SE construct as seen in Table 6.7 was computed as follows:

$$CR = \frac{(0.711 + 0.708 + 0.871)^2}{(0.711 + 0.708 + 0.871)^2 + (0.494 + 0.498 + 0.241)}$$

$$= 0.809$$

A value that is "0.7 or higher suggests good reliability. Reliability between 0.6 and 0.7 may be acceptable provided that other indicators of a model's construct validity are good." (Hair et al., 2010: 710). As seen in Table 6.7 composite reliability, ranged from 0.757 to 0.863 and Cornbach's α (computed using SPSS 18) ranged from 0.711 to 0.873 with all of the values exceeding the cut-off value of 0.7. This indicates the existence of internal consistency among the variables and so the suitability of these variables for further analysis (Hair et al., 2010). The above results indicated that the data collection instrument could be considered internally consistent and reliable.

Another test of convergent validity is the Average Variance Extracted (AVE). "AVE measures the amount of variance captured by the construct, relative to the amount of variance due to the measurement error" (Huth, 2008: 95). This value is computed as follows.

$$\text{AVE} = \frac{\text{Sum of all squared standardized factor loadings}}{\text{Number of items}}$$

For example AVE for SE construct as seen in Table 6.7 was computed as follows:

$$\text{AVE} = \frac{(0.506 + 0.502 + 0.759)}{3}$$

$$= 0.589$$

If an AVE value is less than 0.5, this implies that the variance captured by the construct is less than the variance due to the measurement error. Therefore, the value of AVE should be higher than 0.5 (Fornell & Larcker, 1981; Huth, 2008). As seen in Table 6.7 AVE values ranged from 0.561 to 0.644 and all of them exceeded the suggested value of 0.5.

Accordingly, the results discussed above indicated evidence of strong convergent validity for the research variables of the measurement model.

Factor	Variables	Standardized Loadings (>0.707)*	Reliability (R^2) (>0.5)*	AVE (>0.5)*	Composite reliability (>0.7)*	Cronbach's Alpha (α) (>0.7)*
Self-efficacy (SE)	SE2	0.711	0.506	0.589	0.809	0.816
	SE3	0.708	0.502			
	SE5	0.871	0.759			
Student attitudes (SA)	SA3	0.779	0.603	0.613	0.826	0.831
	SA4	0.714	0.510			
	SA7	0.853	0.728			
Motivation (MO)	MO3	0.720	0.518	0.644	0.842	0.873
	MO4	0.957	0.916			
	MO5	0.707	0.500			
Computer Experience (CE)	CE1	0.800	0.64	0.611	0.757	0.711
	CE2	0.762	0.581			
Perception of the use of technology	UT1	0.787	0.620	0561	0.836	0.835
	UT2	0.739	0.546			
	UT6	0.720	0.519			
	UT7	0.749	0.561			
Student Participation (SP)	SP1	0.740	0.548	0.596	0.815	0.811
	SP2	0.840	0.705			
	SP3	0.731	0.535			
Perception of the interaction of instructors (II)	II1	0.751	0.563	0.558	0.863	0.863
	II2	0.771	0.595			
	II5	0.710	0.504			
	II 6	0.759	0.576			
	II 8	0.746	0.556			

* Recommended value

Table 6.7: Convergent validity tests and Reliability analysis (internal consistency)

6.6.2 Discriminant validity

Discriminant validity "is the extent to which a construct is truly distinct from other constructs" (Hair et al., 2010:710). "A criterion for discriminant validity is that a construct should share more variance with its indicators than it shares with other constructs in a given model" (Huth, 2008: 95). In order to assure discriminant validity, Fornell and Larcker (1981: 46) suggested that "the average variance extracted (AVE) between a construct and its measures should be greater than the variance shared (the squared correlation) between the construct and other constructs". This method is considered as the most rigorous test of discriminant validity (Hair et al., 2010). In this test a comparison is conducted between the average variance extracted

(AVE) for any two constructs with the squared correlation between the same two constructs. If the AVE is more than the squared correlation estimate this implies that the "latent construct explains more of the variance in its items measures that it shares with another construct" (Hair et al., 2010:710). Accordingly, this provides an evidence of strong discriminant validity.

Table 6.8 shows the construct correlation matrix. In this table values below the diagonal are correlation estimates between the constructs, diagonal values are construct variances, and values above the diagonal are squared correlations.

	SA	**MO**	**SE**	**CE**	**UT**	**II**	**SP**
SA	1	0.019	.004	0.158	0.015	0.020	0.009
MO	0.096	1	.004	0.026	0.005	0.004	0.017
SE	0.063	0.064	1	0.063	0.002	0.000	0.004
CE	0.398	0.160	0.252	1	0.003	0.020	0.005
UT	0.123	-0.073	-0.039	-0.053	1	0.012	0.008
II	0.142	0.062	0.015	0.143	0.109	1	0.007
SP	0.097	0.132	-0.065	-0.067	0.089	0.081	1

Note: Values below the diagonal are correlation estimates among constructs, diagonal elements are construct variances and values above the diagonal are squared correlations.

Table 6.8: Constructs correlation matrix

All AVE estimates (see Table 6.7) were found to be greater than the corresponding interconstruct squared correlation estimates in Table 6.8 (above the diagonal). For example squared correlation estimate between SA and MO constructs is 0.019 which is lower than the AVE values for SA (0.613) and MO (0.644) seen in Table 6.7. This indicates that latent constructs explain more of the variance in its item measures that it shares with another construct. Thus, the existence of discriminant validity is strongly supported

Therefore, this test indicates that the CFA models had no problems with discriminant validity. Thus, the convergent and discriminant validity of the measurement can be demonstrated. All of the CFA results indicated that the best-fitting measurement model was acceptable. As a result, the originated measurement models were incorporated into the SEM analysis.

6.7 Hierarchical regression analysis and structural equation modelling (SEM)

In the current study, hierarchical regression analysis was applied on the two research models to evaluate the extent to which student characteristics (inputs) and student perceptions of the interaction in web-based courses (environment) affected student performance and change in performance. While the SEM was used for two purposes. Firstly, to revise and examine the proposed structure of the study models. Secondly, the path values from conducting the SEM were used to test the study hypotheses.

6.7.1 Hierarchical regression analysis

Hierarchical regression is a method of multiple regression in which the order in which variables are entered into the regression model is determined by the researcher based on previous research: variables already known to be predictors are entered first, and new variables are entered subsequently (Field, 2009). Therefore, variables are divided into sets of variables and then entered into a model in a predetermined order that may infer some causal or potentially mediating relationships between the predictors and the dependent variable. In the current research, the independent variables were divided into two sets. The first set included the input variables; namely, prior performance, student attitudes toward web-based learning, self-efficacy, motivation and computer experience. The second set included the environmental variables: student interaction in the web-based course that was related to student participation in the web-based course environment, student perceptions of the use of technology and student perceptions of the interaction of instructors. A hierarchical regression was used, because there was conceptual support for entering input variables before environmental variables (Field, 2009). The input variables (student characteristics) were entered first. The initial entry of the input variables helped control for the influence of these variables on student performance, which allowed for a stronger interpretation of the causal inferences regarding the environmental variables (Astin, 1993).

6.7.2 Structural equation modelling (SEM)

SEM is defined as a "multivariate technique combining aspects of factor analysis and multiple regression that enables the researcher to simultaneously examine a series of interrelated dependence relationships among the measured variables and latent constructs (variables) as well as between several latent constructs" (Hair et al., 2010: 634). SEM is a family of statistical models that seeks to explain the relationships among multiple variables and to test a theory. A priori theory is a necessary condition to obtain useful results from SEM in order to specify the relationships in the model, relationships modifications, and estimating the model (Hair et al., 2010).

The SEM technique was used for the following reasons:

1. Unlike regression analysis, SEM has the ability to analyse complex models in a single, unified process (Gefen et al., 2000) and provides a more rigorous variance analysis (Bollen, 1989; Bullock et al., 1994).
2. In SEM, both common variance and specific and error variance can be included explicitly in the research model (Hair et al., 2010).
3. In comparison to regression techniques, SEM techniques provide better information to determine whether the data support the study model (Gefen et al., 2000).

CFA is one type of analysis that falls under the SEM family. The difference between CFA and SEM is that CFA concentrates on the relationships between the indicators and latent variables, whereas SEM estimates structural or causal paths between latent variables (Harrington, 2008). Thus, CFA is considered a preliminary step of SEM analysis, because CFA alone is limited in its ability to examine the nature of the relationships between variables beyond simple correlations (Hair et al., 2010).

6.7.3 Hierarchical regression analysis using structural equation modelling

In the current research, hierarchical regression analysis using SEM was conducted to evaluate the extent to which student characteristics (inputs) and student interaction in the web-based courses (environment) affected student performance. This was done in order to answer the study's questions, which started with a broad question in the first phase (i.e., What are the factors that may affect student performance in web-based courses?) to very specific questions in the second phase. These questions were related to the relationship between student perceptions of the interaction activities in web-based courses and their performance while controlling for student characteristics (i.e., Do student perceptions of the interaction of instructors in web-based courses affect their performance? Do student perceptions of the use of technology affect their performance? Does student participation in the online learning environment affect their performance?) Accordingly, a path analysis for the structural equation model with latent variables was performed by entering the input variables as the first step to account for any influence that might have been due to student characteristics present before the start of the web-based course. Once the covariance between student characteristics and student performance was determined, the environmental (interaction) variables were entered as a group in the second block. Any additional significant covariance with student performance was then attributed to the interaction variables.

Figure 6.2 displays the standardized parameter estimates indicating direct effects of the input variables (panel a) and both input and environmental variables (panel b). In Figure 6.2, measured variables are shown with a box with labels corresponding to those variables shown in the questionnaire. Latent constructs are shown with an oval that are measured through observed indicators. Each measured variable has an error termed (e) associated with it this error represents the amount of measurement error present in the indicators and results in an inability to fully explain these measures. Two headed connections indicate covariance between constructs. One headed connectors from the constructs to the indicators indicate a causal path from a construct to an indicator (loading estimates). One headed arrows from the construct to another construct indicate the hypothesized causal relationships (direct effect). The R^2 value (this value indicates the percentage of total variation in student current performance (CP) explained by the model) is displayed above the rectangle for student current performance (CP). Numbers above the one headed arrows are the standardized regression coefficient, this value indicates a direct relationship from a construct to its indicators or from an independent variable to dependent variable, while numbers above the two headed arrows are the correlations between the constructs.

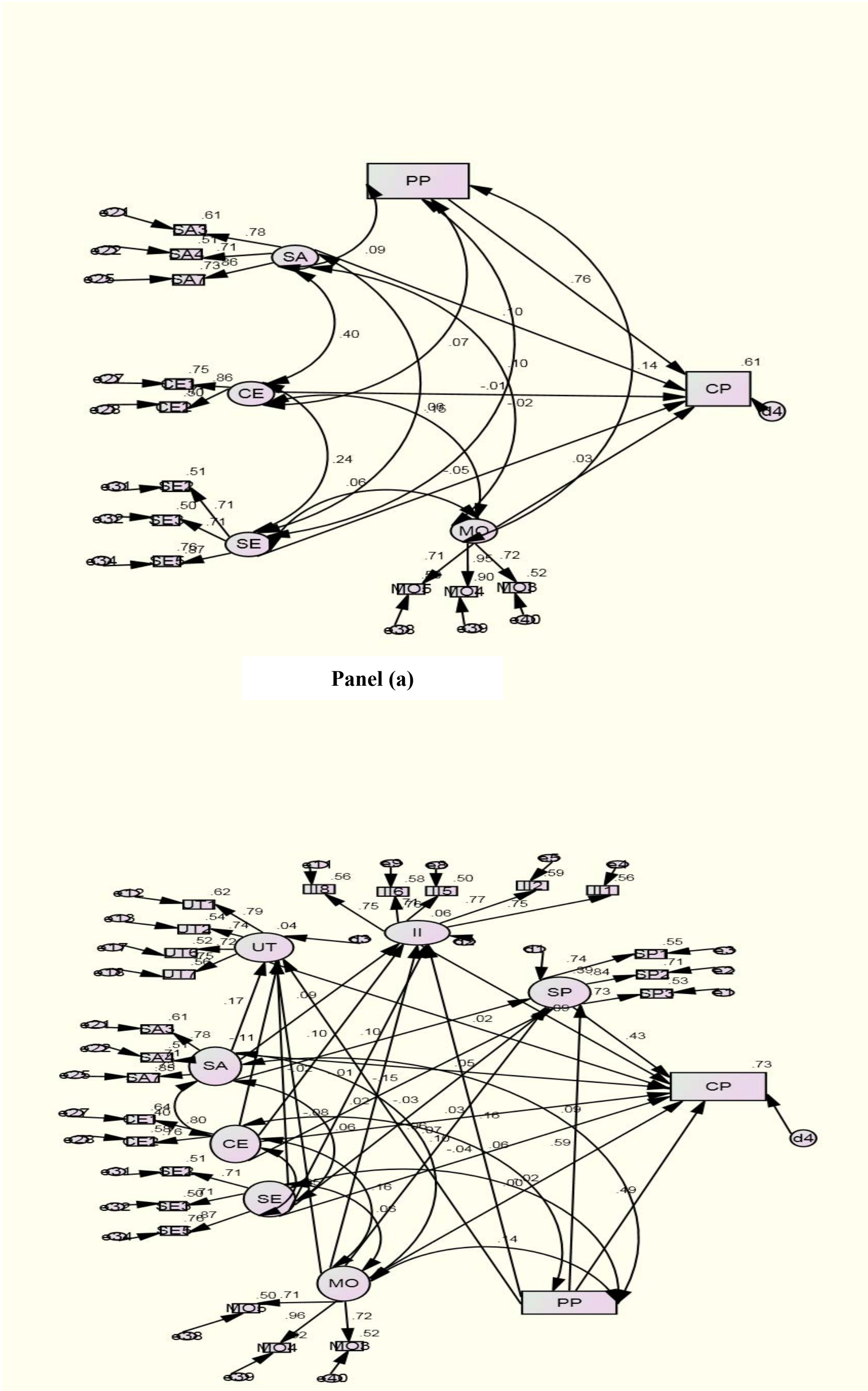
In the first step (Figure 6.2, panel a), the five input variables were entered as a group. These variables accounted for 61% of the variance (R^2= 0.615, Adjusted R^2 = 0.61), which was statistically significant [F (12, 448) = 59.681, $P<.001$]. The initial entry of the four input variables helped to control for student characteristics.

In the second step (Figure 6.2, panel b), the interaction variables (environmental)—namely, student participation in the web-based course, student perceptions of the use of technology and student perceptions of the interaction of instructors—were entered. They accounted for an additional 12% of the variance, which was significant [$F (12, 436) = 12.565$, $P< 0.001$].

Accordingly, the interaction variables (environmental) accounted for a significant proportion of the performance variance after controlling for the effect of student characteristics (inputs). The statistical significance of the environmental variables (interaction) in the second step (panel b) provided support for the idea that student perceptions of the interaction that occurs in web-based learning help determine the effect of these variables on student performance.

The overall hierarchical regression using SEM, including input and environment variables, explained 73% of the variance in student performance. The path analysis for the structural equation model with the latent variables was conducted to evaluate the hypothesized relationships that may affect student performance (Model I) and change in performance (Model II). According to the best-fitting measurement model, the structural equation models (Models I and II) were based on the relationship proposed by Astin (1993) that environmental variables mediate the relationship between input variables (student characteristics and student outcome (performance)) (Figure 6.2, panel b).

In order to help explain the results a section of Figure 6.2 is magnified and presented in Figure 6.3. This was done for SP (student participation) as an example. In this figure values above the one headed arrow from the construct to the items represents the standardized loadings (standardized regression weights using AMOS terminology) for SP1, SP2, and SP3 which are 0.74, 0.84, and 0.73 respectively. As these are more than the cut-off value (0.7) this indicates that they converge on a common point, the latent construct SP, thus it represents high convergent validity (Hair et al., 2010). Squared standardized loading (R^2) are presented above each indicator for SP; for example the squared standardized loading for SP3 is 0.53 which implies that the SP factor explains 53 percent of the variation in SP3 and the remaining percentage represents the error variance (e1). As well R^2 for SP is presented above the SP oval which is 0.39 which represents the percentage of total variation in student participation explained by the model and the remaining percentage represents error variance (d1). The one headed arrow from SA to SP and from SP to CP represents the standardized direct effects which are 0.10 and 0.43 respectively. The value on the two headed arrow between SA and PP represents the covariance (correlation) between the two constructs which is 0.09. This value measures the average relationship between SA and PP.



Panel (a)

Panel (b)

CP: Current Performance
PP: Prior Performance
Latent variables
SA: Student Attitude toward web-based learning.
CE: Computer experience
SE: Self efficacy
MO: Motivation
UT: Student perceptions of the use of technology
II: Student perceptions of the interaction of the instructor.
SP: Student participation.

These latent variables were measured through the following observed indicators

Observed Indicators
For SA are SA3, SA4, and SA7.
For CE are CE1, and CE2.
For SE are SE2, SE3, and SE5.
For MO are MO3, MO4, MO5.
For UT are UT1, UT2, UT6, and UT7.
For II are II1, II2, II5, II6, and II8.
For SP are SP1, SP2, and SP3

Those variables are shown in the questionnaire (see Table 6.6)

Figure 6.2: Standardized parameter estimates for Model I

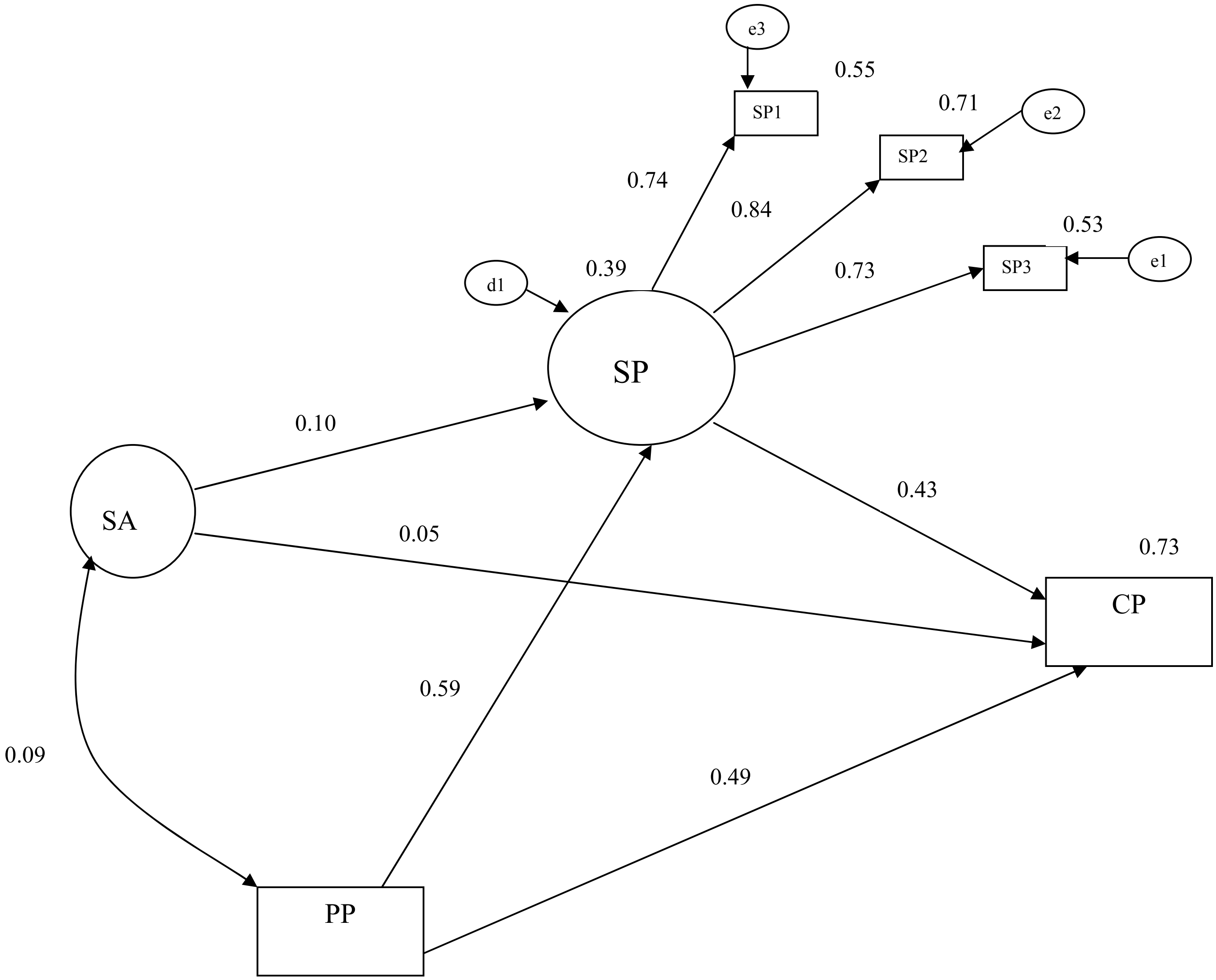


Figure 6.3: Partial standardized estimates

6.7.3.1 Examining the structural model validity

After specifying the structural models (Figure 6.4 and 6.5) the overall model fit was examined for both models. This can be done by different techniques such as, nested models and fit indices. “A model is nested within another model if it contains the same number of constructs and can be formed from the other by altering the relationships”. (Hair et al., 2010: 633). The nested models approach is based on comparing chi-square difference statistic for the nested SEM models. This method has some limitations in that the chi-square value is affected materially by the sample size. That the increase in the sample size will make chi-square value greater and so it will be very difficult to achieve model fit (Hair et al., 2010). Accordingly, several goodness of fit indices were developed to overcome the bias that occurs as a result of the large sample and complex models. These fit indices are widely used by researchers to assess model fit (Steiger et al., 1985). Thus, and due to the large sample size in the current study (461) the researcher did not apply the nested models for validating the study proposed models. Moreover, this research is an exploratory study rather than predictive one in that it was conducted to examine factors that are important in understanding student's performance in accounting web-based courses in order to improve the teaching practices in accounting at the Hashemite University. Therefore, applying the nested models would not help in answering the research questions about investigating and identifying factors that affect students' performance in accounting web-based courses.

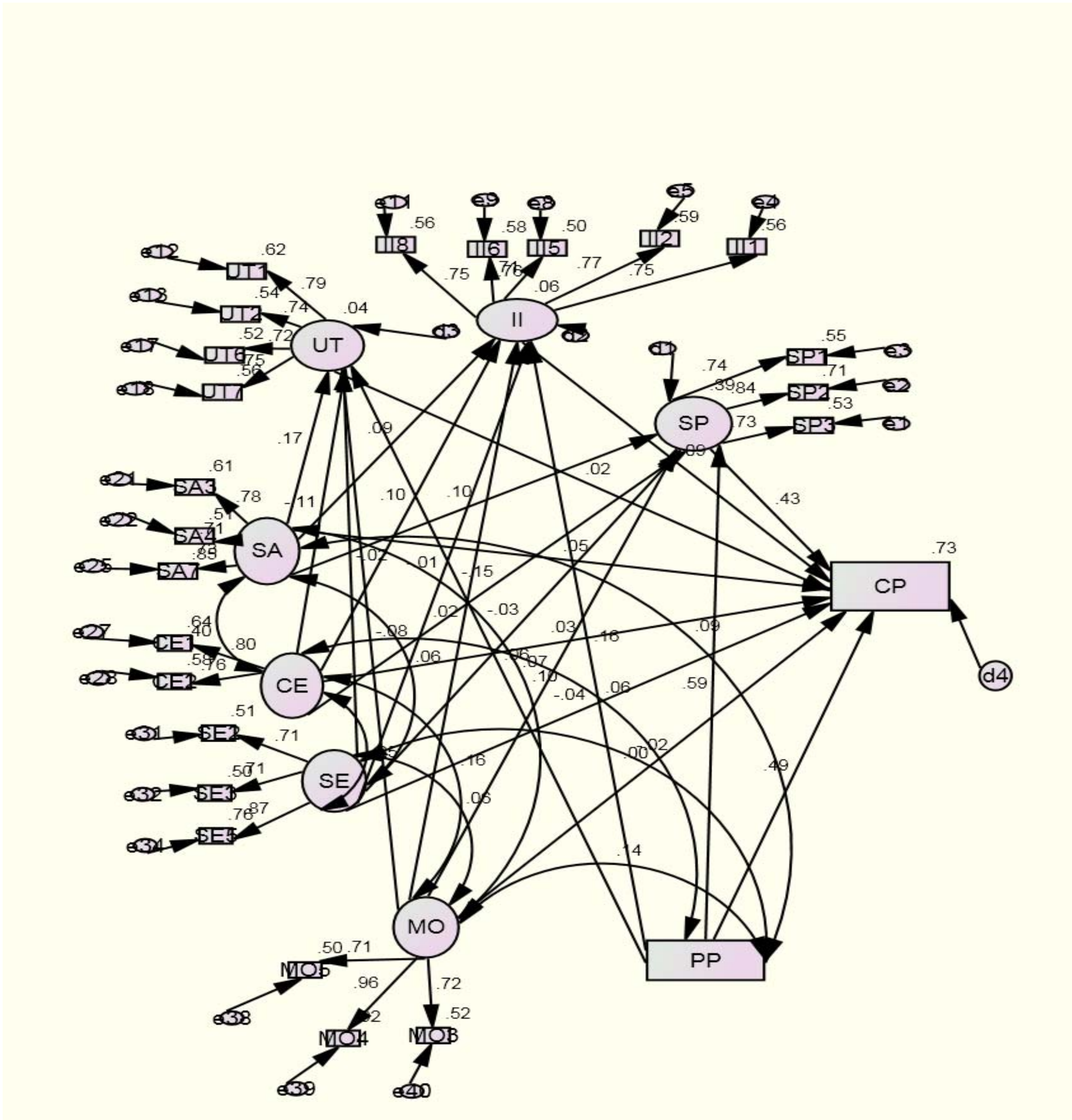


Figure 6.4 Structural model I

Several studies have indicated that prior performance plays a major role in predicting future performance (for example, Power, 1987; Mckenzie and Schweltzer, 2001; Dowling et al., 2003). Thus, this study proposes Model II to include the change in student performance as a dependent variable instead of student performance at the end of the semester, as seen in Figure 6.4.

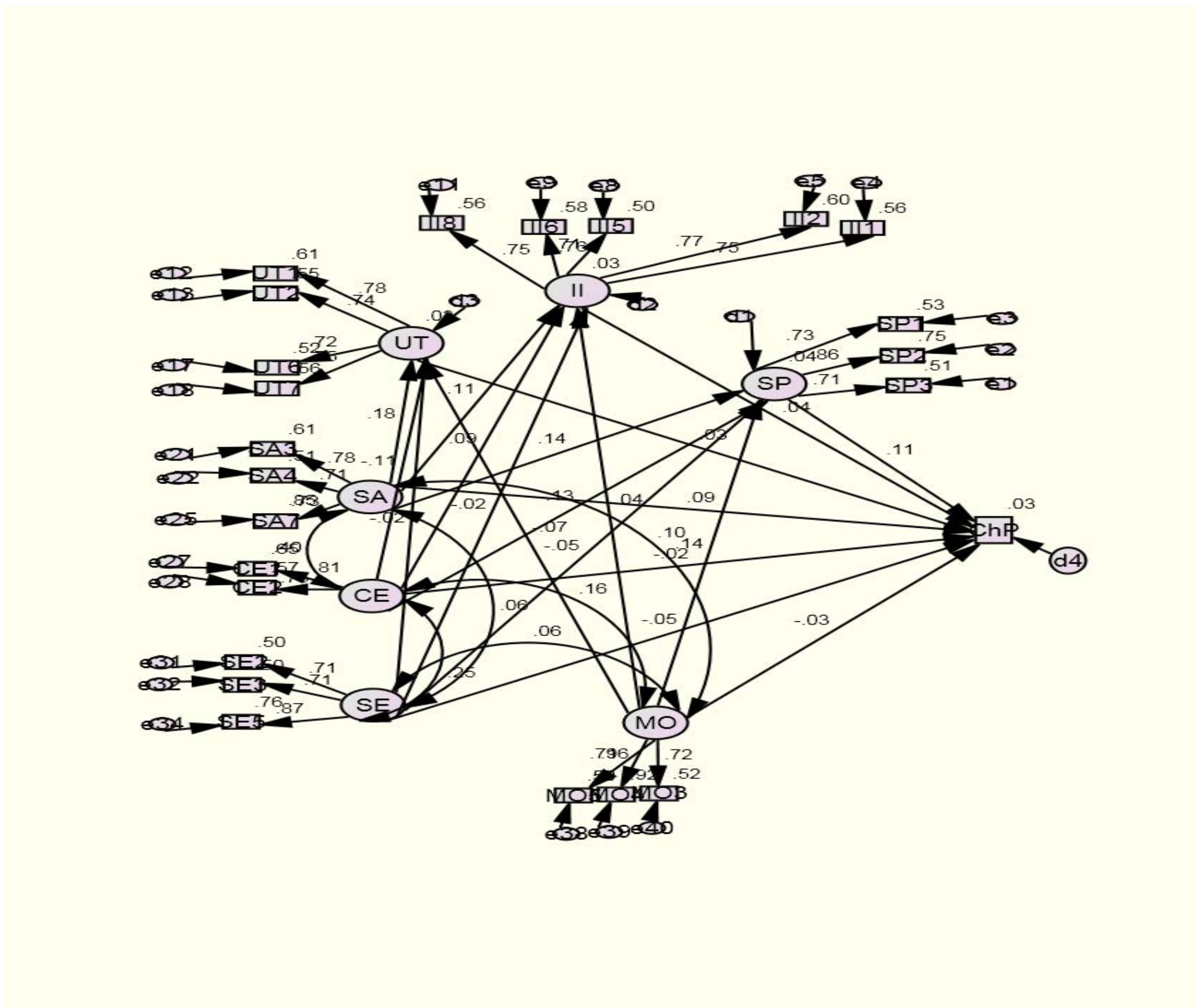


Figure 6.5: Structural model II

The main difference between the previous two models is the dependent variable. That is, in the first model, the researcher used student performance at the end of the semester, but in the second model, the researcher used change in student performance as the dependent variable

Table 6.9 presents the overall fit statistics from testing Model I and II. Chi-square/df values were 1.725 and 1.798 for model I and model II respectively, which is less than the recommended cut-off value. GFI (0.914, 0.930), NFI (0.919, 0.907) and CFI (0.964, 0.956) were all greater than the acceptable level of 0.9 for both models. AGFI (0.909, 0.908) was greater than the acceptable level of 0.8 for model I and model II and RMSEA (0.040, 0.042) was within the acceptable range. Accordingly, the results indicated a good fit to the data for the two model.

Model Goodness-fit Indexes	**Recommended Value**	**Results model I**	**Results model II**
Chi-square		420.890	409.896
Degrees of freedom		244	228
Chi-square/df	≤ 3.00	1.725	1.798
Goodness-of-fit index (GFI)	> 0.90	0.914	0.930
Adjusted goodness-of-fit index (AGFI)	> 0.80	0.909	0.908
Normed fit index (NFI)	> 0.90	0.919	0.907
Comparative fit index (CFI)	> 0.90	0.964	0.956
Root mean square error of approximation (RMSEA)	≤ 0.08	0.040	0.042

Table 6.9: SEM statistics of Model I and Model II fit

Fit statistics for the theoretical model should be the same as those obtained for the CFA model. It can be seen that the overall model fit was almost identical to the CFA model for both models (see Table 6.10).

Model Goodness-fit Indexes	**Results model I**	**CFA model I**	**Results model II**	**CFA model II**
Chi-square	420.890	416.562	409.896	403.207
Degrees of freedom	244	241	228	225
Chi-square/df	1.725	1.728	1.798	1.792
Goodness-of-fit index (GFI)	0.914	0.932	0.930	0.931
Adjusted goodness-of-fit index (AGFI)	0.909	0.909	0.908	0.909
Normed fit index (NFI)	0.919	0.919	0.907	0.909
Comparative fit index (CFI)	0.964	0.964	0.956	0.957
Root mean square error of approximation (RMSEA)	0.040	0.040	0.042	0.041

Table 6.10 comparison of goodness-of- fit measures between Model I, Model II and CFA models

A major advantage of SEM is the ability to estimate a complete model incorporating both measurement and structural considerations. After conducting the path analysis, the structural model could then be estimated and assessed.

Next, the loading estimates in the structural equation model were tested to ensure that they had not changed substantially from the CFA model (Table 6.11 and Table 6.12); as this will support the models' validity. The loadings were virtually similar to the CFA results (the maximum change was 0.003 and 0.005 for Model I and Model II respectively).

This presents evidence of the parameter stability among the measured items and the lack of problems stemming from interpretational confounding[7], this further supports the validity of the measurement model and so the construct reliabilities are identical. (Hair et al., 2010).

Factor	**Variables**	**CFA Standardized Loadings**	**SEM Standardized loadings**	**Difference**
Self-efficacy (SE)	SE2	0.711	0.711	------
	SE3	0.708	0.708	------
	SE5	0.871	0.871	------
Student attitudes (SA)	SA3	0.779	0.779	-----
	SA4	0.714	0.714	-----
	SA7	0.853	0.853	-----
Motivation (MO)	MO3	0.720	0.720	-----
	MO4	0.957	0.957	-----
	MO5	0.707	0.707	-----
Computer Experience (CE)	CE1	0.800	0.799	-0.001
	CE2	0.762	0.763	0.001
Perception of the use of technology	UT1	0.787	0.785	-0.002
	UT2	0.739	0.738	-0.001
	UT6	0.720	0.723	0.003
	UT7	0.749	0.750	0.001
Student Participation (SP)	SP1	0.740	0.740	------
	SP2	0.840	0.840	------
	SP3	0.731	0.731	------
Perception of the interaction of instructors (II)	II1	0.751	0.751	-----
	II2	0.771	0.771	----
	II5	0.710	0.709	- 0.001
	II 6	0.759	0.759	----
	II 8	0.746	0.746	----

Table 6.11: Loading estimates for CFA and SEM model I

[7] "Measurement estimates for one construct are significantly affected by relationships other than those among the specific measures. It is indicated when loading estimates vary substantially from one SEM to another model that is the same except for the change in specification of one or more relationships" Hair et al., (2010:690).

Factor	Variables	CFA Standardized Loadings	SEM Standardized loadings	Difference
Self-efficacy (SE)	SE2	0.710	0.710	------
	SE3	0.708	0.708	------
	SE5	0.872	0.872	------
Student attitudes (SA)	SA3	0.778	0.778	-----
	SA4	0.713	0.713	-----
	SA7	0.856	0.855	0.001
Motivation (MO)	MO3	0.719	0.720	0.001
	MO4	0.958	0.957	- 0.001
	MO5	0.706	0.707	0.001
Computer Experience (CE)	CE1	0.804	0.809	0.005
	CE2	0.759	0.754	- 0.005
Perception of the use of technology	UT1	0.787	0.783	-0.004
	UT2	0.740	0.739	-0.001
	UT6	0.720	0.724	0.004
	UT7	0.749	0.750	0.001
Student Participation (SP)	SP1	0.732	0.729	-0.003
	SP2	0.860	0.864	0.004
	SP3	0.717	0.715	-0.002
Perception of the interaction of instructors (II)	II1	0.750	0.750	-----
	II2	0.772	0.772	----
	II5	0.710	0.709	- 0.001
	II 6	0.758	0.759	0.001
	II 8	0.746	0.746	----

Table 6.12: Loading estimates for CFA and SEM model II

6.8 The final model I

The final model I was presented by the following structural equation with non-standardized regression coefficients:

$$CP = 0.461\ PP + 0.212\ SP + 0.063\ II - 0.032\ SE + 0.026\ SA + 0.022\ CE + 0.015\ UT - 0.001\ MO$$

$R^2 = 0.73$ *Error variance = 0.27*

Where

***CP**: the current performance at the end of the semester*

***PP**: prior performance*

***SP**: student participation*

II*: student perceptions of the interaction of the instructor*
SE*: self efficacy*
SA*: student's attitude toward web-based learning*
CE*: computer experience*
UT*: student perceptions of the use of technology*
MO*: Motivation*

The path values in the above equation represent the regression coefficients in the structural equation of the model. The error variance is $1-R^2$, which represents the portion of variance in the current performance (CP) that was not explained by the input and environmental variables.

The direct effect of the exogenous variable on the endogenous variable is represented by the path coefficient of the exogenous variable. An indirect effect represents the effect that can be interpreted by intervening or moderating variable. It is the product of the path coefficients along an indirect route from cause to effect via tracing arrows in the headed direction only (Al-Gahtani, 2002). If there are more than one indirect path, then their sum is the total indirect effect. The total effect of the exogenous variable on the endogenous variable is the sum of direct and indirect effect (Alwin & Hauser, 1975; Ross, 1975). Table 6.13 shows the standardized direct, indirect and total effects indicated by the model. To interpret the extent of the effect, Cohen's (1988) recommendations were used. Cohen suggested that a standardized path coefficient with an absolute value of less than 0.10 indicates a small effect, 0.30 a medium effect and 0.50 a large effect.

For example, the major determinant of current student performance (CP) was prior performance, with a total effect of 0.771, mainly due to direct effect (0.494) and partly due to indirect effect (0.272). The second determinant was the direct effect of student participation (SP) in the web-based learning environment (0.428). The third determinant was student attitude toward web-based learning (SA) with a total effect of 0.103, mainly due to indirect effect (0.053) and direct effect (0.050). The fourth determinant was student perceptions of the interaction of instructors, with a total direct effect of (0.100). The fifth, sixth, seventh, and eighth were self-efficacy, motivation, student perceptions of the use of technology and computer experience, with a total effect of 0.052, 0.027, 0.023 and -0.020, respectively.

Factor	**Determinant**	**Direct effect**	**Indirect effect**	**Total effect**
Current performance (CP) R^2=0.73	PP	**0.494**	**0.272**	**0.771**
	SA	0.050	0.053	**0.103**
	MO	-0.001	0.026	0.027
	SE	-0.039	-0.013	-0.052
	CE	0.033	-0.054	-0.020
	UT	0.023	-----	0.023
	II	0.090	-----	0.090
	SP	**0.428**	-----	**0.428**
Student participation (SP) R^2=0.39	SA	0.097	-----	0.097
	CE	**-0.139**	-----	**-0.139**
	SE	-0.027	-----	-0.027
	MO	0.060	-----	0.060
	PP	**0.598**	-----	**0.598**
Perception of the use of technology (UT) R^2 =0.04	SA	**0.171**	-----	**0.171**
	CE	-0.106	-----	-0.106
	SE	-0.016	-----	-0.016
	MO	-0.08	-----	-0.08
	PP	-0.057	----	-0.057
Perception of the interaction of instructors (II) R^2 =0.06	SA	0.091	----	0.091
	CE	**0.100**	----	**0.100**
	SE	-0.012	----	-0.012
	MO	0.020	----	0.020
	PP	**0.163**	----	**0.163**

Note: Effects of size greater than 0.1 in bold

Table 6.13: Standardized effects for Model I

According to Cohen's guideline, prior student performance had a large total effect (0.771) on performance. Student participation (SP) had a medium total effect (0.428), and self-efficacy, motivation, student perceptions of the use of technology and computer experience had small total effects (0.020, 0.027, 0.023 and -0.020, respectively) on student performance. In

Table 6.13, effect sizes greater than or equal 0.1 are shown in bold. The model explained 73% of the variance in student performance. Prior performance was the major determinant of student participation (SP), with a total effect of 0.59. This was followed by computer experience, with a total effect of -0.139; student attitudes toward web-based learning (SA), with a total effect of 0.103 and motivation, with a total effect of -0.027. Thus, prior performance had the largest total effect on student participation. This model explained 39% of the variance in student participation.

With regard to student perceptions of the interaction of instructors, the main effect was due to prior student performance, with a total direct effect of 0.163. This was followed by computer experience, with a total direct effect of 0.1, and student attitudes toward web-based learning, with a total direct effect of 0.09. Other determinants were motivation and self-efficacy, with total direct effects of 0.02 and 0.012, respectively. Based on Cohen's effect size guideline, all of these determinants had a small effect on student perceptions of the interaction of instructors. However, these variables failed to explain more than 6% of the variance in student perceptions of the interaction of instructors. The same findings were found regarding the effect of the input and environmental variables on student perceptions of the use of technology; that is, only 4% of the variance was explained by these variables.

Table 6.14 shows the values that were used to examine the significance of the path values that is whether these values were significantly different from zero. These values were critical ratio or t-values (obtained by dividing the path values by their standard errors) (Abbad, 2009). If the critical ratio (|t-value|) is greater than 1.96 and the significance level is less than 0.05 this implies that the path value is significantly different from zero (Hair et a., 2010). As shown in Table 6.14, 9 of 23 paths were significant. For example the critical ratio for the path from SP to

CP is 9.803 which is greater than 1.96 (P< 0.005) this indicates that the path value is significantly different from zero. This result suggests that the direct path from student participation (SP) to student current performance (CP) is significant. Accordingly, this would support the study hypothesis regarding the positive effect of SP on CP.

Path	Critical ratio	Sig. Level	Comment
SP → CP	9.803	0.000	**Sig.**
PP → CP	13.730	0.000	**Sig.**
II → CP	3.114	0.002	**Sig.**
SE → CP	1.318	0.188	Not sig.
SA → CP	2.421	0.006	**Sig**.
CE → CP	0.916	0.316	Not sig.
UT → CP	0.788	0.430	Not sig.
MO → CP	0.022	0.982	Not sig.
CE → SP	2.169	0.030	**Sig**,
MO → SP	1.429	0.153	Not sig.
SA → SP	1.818	0.069	Not sig.
SE → SP	-0.56	0.576	Not sig
PP → SP	11.997	0.000	**Sig**.
CE → II	1.367	0.172	Not sig.
MO → II	0.302	0.763	Not sig.
SA → II	1.469	0.142	Not sig.
SE → II	-0.245	0.806	Not sig.
PP → II	3.207	0.001	**Sig**.
CE → UT	1.457	0.126	Not sig.
MO → UT	2.078	0.008	**Sig.**
SA → UT	2.700	0.007	**Sig.**
SE → UT	0.303	0.762	Not sig.
PP → UT	1.084	0.278	Not sig.

Note: significant relation in bold

Table 6.14: Results of path test

6.9 Testing hypotheses related to Model I

Table 6.15 presents a summary of the hypotheses and the support of these hypotheses related to the first model (Model I). Hypotheses 1-3, 7 and 10-13 investigated the relationship between student performance and the input variables (student characteristics); namely, prior performance, computer experience, self-efficacy, student attitudes toward web-based learning, and motivation. They also investigated the association between student performance and the environmental variables (student interaction in the web-based courses) related to student perceptions of the interaction of instructors, student perceptions of the use of technology and student participation in web-based courses.

Hypotheses	Result
H1: There is a positive relationship between student perceptions of the interaction of instructors and performance in web-based courses.	Supported
H2: There is a positive relationship between student perceptions of the use of technology and performance in web-based courses.	Not supported
H3: There is a positive relationship between student perceptions of their participation in the web-based learning environment and performance.	Supported
H4: There is a positive relationship between student computer experience and interaction in web-based courses.	Supported
H5: There is a positive relationship between student motivation and interaction in web-based courses.	Supported
H6: There is a positive relationship between student attitudes toward web-based learning and interaction in web-based courses.	Supported
H7: There is a positive relationship between prior student performance and performance in web-based courses.	Supported
H8: There is a positive relationship between self-efficacy and student interaction in web-based courses.	Not supported
H9: There is a positive relationship between prior student performance and interaction in web-based courses.	Supported
H10: There is a positive relationship between student computer experience and performance in web-based courses.	Not supported
H11: There is a positive relationship between student self-efficacy and performance in web-based courses.	Not supported
H12: There is a positive relationship between student attitudes toward web-based learning and performance in web-based courses.	Supported
H13: There is a positive a relationship between student motivation and performance in web-based courses.	Not supported

Table 6.15: Summary of the hypotheses related to Model I

Hypotheses 1-3 postulated that student interaction (related to student perceptions of the interaction of instructors (H1), student perceptions of the use of technology (H2) and student participation in the web-based learning environment (H3)) has a positive influence on current student performance. The results showed that student participation in a web-based learning environment had a strong direct effect on performance (β= 0.428). In addition, the critical ratio (9.803) exceeded the critical value of 1.96 with a significance level of less than 0.05 (0.000). Student perceptions of the interaction of instructors had a small direct effect on performance (β = 0.09). In addition, the critical ratio (3.114) exceeded the critical value of 1.96 with a significance level of less than 0.05 (0.002). However, student perceptions of the use of technology had a weak direct effect on student performance (β = 0.023), and the critical ratio (0.788) was less than the minimum value (1.96). Accordingly, the results suggest that the direct paths from student participation (SP) and student perceptions of the interaction of instructors (II) to student performance are significant, while the path from student perceptions of the use of technology to student performance is insignificant. Thus, H1 and H3 were supported, while H2 was not supported.

Hypothesis 7 and Hypotheses 10-13 postulated that prior student performance (H7), computer experience (H10), self-efficacy (H11), student attitudes toward web-based learning (H12) and student motivation (H13) would have a positive influence on student performance. The results indicated that prior performance had a strong direct effect on student performance (β = 0.494). Moreover, the critical ratio (13.730) exceeded the critical value of 1.96. While student attitudes had a small direct effect (β = 0.05), the critical ratio (2.421) exceeded the critical value (1.96) with a significance level of less than 0.05 (0.006). Regarding the remaining input variables (i.e., computer experience, self-efficacy and motivation), the results showed that all of these variables had a weak direct effect on student performance, with critical ratios less than 1.96. Accordingly, the direct paths from prior student performance and student attitudes to student performance were found to be significant, but the paths from computer experience, self-efficacy and motivation were not. Thus, H7 and H11 were supported, while H10, H12 and H13 were not supported.

Hypotheses 4-6 and 8-9 investigated the influence of the input variables (student characteristics) on the environmental variables (student perceptions of interaction activities in the web-based learning environment) related to student participation in web-based learning, student perceptions of the interaction of instructors and student perceptions of the use of technology. The results showed that computer experience (H4) has a significant direct effect on student participation ($\beta = 0.139$, critical ratio = 2.169, $P < 0.05$). On the other hand, student attitudes (H6) and motivation (H5) had a significant direct effect on student perceptions of the use of technology ($\beta = 0.171$ and 0.08, respectively; critical ratios = 2.700 and 2.078, respectively; $P<0.05$). Prior student performance (H9) also had a positive direct effect on student interaction related to student participation in the web-based learning environment and perceptions of the interaction of instructors ($\beta = 0.598$ and 0.163, respectively; critical ratios = 11.997 and 3.207, respectively; $P<0.05$). Hypothesis 8 postulated that student self-efficacy has a positive influence on student interaction in web-based learning. The results showed that it has a weak direct effect on student interactions, and the critical ratio was less than 1.96.

Thus, the direct paths from computer experience, motivation, attitude and prior performance to student perceptions of interaction in web-based learning environment were found to be significant, while the path from self-efficacy to student perceptions of interaction in web-based learning environment was not. Therefore, H4, H5, H6 and H9 were supported, while H8 was not.

The analysis of the structural model shows that student interaction in web-based courses (Student participation in web-based courses, and student perceptions of the interaction of instructors), prior performance, and student attitudes toward web-based learning are the dominant factors affecting student performance. The results also demonstrate the importance of computer experience, student attitudes toward web-based learning, motivation and prior performance to student interactions in web-based learning.

6.10 The influence of demographic differences on the factors

Several analyses of variance (ANOVAs) were conducted to determine the impact of the demographic variables (gender, age, ownership of a computer and connection to the Internet) on the study's factors (current performance, student participation, perception of the use of technology, perception of the interaction of instructors , student attitudes, computer experience, self-efficacy, motivation and prior performance). An ANOVA is a "statistical technique used to determine whether samples from two or more groups come from populations with equal means (i.e., Do the group means differ significantly?)" (Hair et al., 2010: 440). Thus, it is a statistical procedure that uses the F-ratio to test the overall fit of a linear model (Field, 2009).

6.10.1 ANOVA testing results for gender

The effects of gender on performance (CP), student participation (SP), perception of the use of technology (UT), perception of the interaction of instructors (II), student attitudes (SA), computer experience (CE), self-efficacy (SE), motivation (MO) and prior performance (PP) were examined using an ANOVA. The mean scores, standard deviations, F-ratios and the significance levels of the F-ratios are presented in Table 6.16. As seen in Table 6.16, female students had a higher mean score than male students for all factors except for SP, SE and MO.

Using a significance level of 0.10, significant gender differences were found for student perceptions of the interaction of instructors. That is, females' ratings of the interaction of instructors (M= 3.84) were higher than those of males (M= 3.69) (F= 3.053; P= 0.081).

					F Test	
		N	**Mean**	**Std. Deviation**	**F-ratio**	**F sig.**
CE	Male	211	2.4052	1.06816	1.321	.251
	Female	250	2.5260	1.16953		
	Total	461	2.4707	1.12468		
SP	Male	211	4.8041	1.43079	.176	.675
	Female	250	4.7480	1.42742		
	Total	461	4.7737	1.42768		
SA	Male	211	4.2907	1.07584	.608	.436
	Female	250	4.3733	1.18114		
	Total	461	4.3355	1.13369		
SE	Male	211	3.7393	.86495	.205	.651
	Female	250	3.7027	.86945		
	Total	461	3.7195	.86664		
MO	Male	211	3.8689	1.60264	.010	.922
	Female	250	3.8547	1.52057		
	Total	461	3.8612	1.55697		
UT	Male	211	4.6682	.91359	2.101	.148
	Female	250	4.7930	.92646		
	Total	461	4.7359	.92170		
II	Male	211	3.6976	.87469	3.053	.081
	Female	250	3.8464	.94018		
	Total	461	3.7783	.91283		
CP	Male	211	2.7962	.60989	.402	.526
	Female	250	2.8320	.59892		
	Total	461	2.8156	.60357		
PP	Male	211	2.8578	.63381	.441	.507
	Female	250	2.8980	.65790		
	Total	461	2.8796	.64659		

* $P<0.10$, ** $P<0.05$

Table 6.16: ANOVA testing results for gender

6.10.2 ANOVA testing results for age

The influence of age on SP, UT, II, SA, CE, SE, MO and CP was examined using an ANOVA. Table 6.17 shows the mean scores, standard deviations, F-ratios and significance levels of the F-ratios.

Age categories in the questionnaire were as follows: (1) 20 and under, (2) between 20 and 22, (3) between 23 and 25, and (4) over 25. These categories were reclassified into two categories: 22 and under and over 22.

		N	Mean	Std. Deviation	F Test	
					F-ratio	F sig.
CE	22 and under	441	2.4751	1.13541	.151	.698
	Over 22	20	2.3750	.87170		
	Total	461	2.4707	1.12468		
SP	22 and under	441	4.7800	1.42710	.202	.654
	Over 22	20	4.6333	1.47057		
	Total	461	4.7737	1.42768		
SA	22 and under	441	4.3485	1.13006	1.327	.250
	Over 22	20	4.0500	1.20562		
	Total	461	4.3355	1.13369		
SE	22 and under 22	441	3.7120	.86483	.747	.388
	Over 22	20	3.8833	.91303		
	Total	461	3.7195	.86664		
MO	22 and under	441	3.8927	1.56269	4.189	.041**
	Over 22	20	3.1667	1.26814		
	Total	461	3.8612	1.55697		
UT	22 and under	441	4.7387	.92527	.091	.763
	Over 22	20	4.6750	.85878		
	Total	461	4.7359	.92170		
II	22 and under	441	3.7701	.91593	.828	.363
	Over 22	20	3.9600	.84255		
	Total	461	3.7783	.91283		
CP	22 and under	441	2.8124	.60380	.296	.587
	Over 22	20	2.8875	.60955		
	Total	461	2.8156	.60357		
PP	22 and under	441	2.8747	.64582	.582	.446
	Over 22	20	2.9875	.67119		
	Total	461	2.8796	.64659		

* P<0.10, **P<0.05

Table 6.17: ANOVA testing results for age

As seen in Table 6.17, students who were 22 and under had higher scores than students who were over 22 for five factors; namely, CE, SP, SA, MO and UT. However, the students who were over 22 had higher scores for four factors; namely, SE, II, CP and PP. A significant age difference was found for motivation. That is, young students' (22 and under) motivation ratings (M=3.89) were higher than those of older students (M=3.166) (F= 4.189; P= 0.041).

6.10.3 ANOVA testing results for computer ownership

An ANOVA was used to determine the effect of computer ownership on CP, SP, UT, II, SA, CE, SE and MO. Table 6.18 shows the results, including the mean scores, standard deviations, F-ratios and the significance levels of the F-ratios.

Students who owned a computer had higher scores than those who did not for all factors except for CE, SA and MO. Significant computer ownership differences were found for student participation (SP), current performance (CP) and prior performance (PP). These results indicate that students who owned a computer rated their participation (SP) (M= 4.81) higher than students who did not (M= 4.48) (F=2.955; P= 0.086). Moreover, students who owned a computer had significantly higher performance (M= 2.83) than those who did not (M=2.69) (F= 2.965; P=0.086). In addition, computer ownership was found to significantly affect prior performance (PP). That is, students who owned a computer had better prior performance (M= 2.90) than those who did not (M= 2.71) (F= 5.102; P=0.024).

		N	Mean	Std. Deviation	F Test	
					F-ratio	F sig.
CE	Yes	397	2.4635	1.12504	.118	.731
	No	64	2.5156	1.13028		
	Total	461	2.4707	1.12468		
SP	Yes	397	4.8195	1.39167	2.955	.086*
	No	64	4.4896	1.61668		
	Total	461	4.7737	1.42768		
SA	Yes	397	4.3317	1.13311	.033	.856
	No	64	4.3594	1.14597		
	Total	461	4.3355	1.13369		
SE	Yes	397	3.7204	.88441	.003	.953
	No	64	3.7135	.75328		
	Total	461	3.7195	.86664		
MO	Yes	397	3.8455	1.54893	.289	.591
	No	64	3.9583	1.61507		
	Total	461	3.8612	1.55697		
UT	Yes	397	4.7500	.92455	.669	.414
	No	64	4.6484	.90602		
	Total	461	4.7359	.92170		
II	Yes	397	3.7914	.92640	.591	.442
	No	64	3.6969	.82577		
	Total	461	3.7783	.91283		
CP	Yes	397	2.8350	.59341	2.965	.086*
	No	64	2.6953	.65536		
	Total	461	2.8156	.60357		
PP	Yes	397	2.9068	.63226	5.102	.024**
	No	64	2.7109	.71161		
	Total	461	2.8796	.64659		

* $P<0.10$, ** $P<0.05$

Table 6.18: ANOVA testing results for computer ownership

6.10.4 ANOVA testing results for connection to the Internet

Finally, the impact of the availability of an Internet connection on SP, CE, UT, II, CP, PP, CE, SA and MO was tested using an ANOVA. Table 6.19 presents the results, including mean scores, standard deviations, F-ratios and significance levels of the F-ratios. The results show that the students who had an Internet connection at home had higher scores for all factors except for SA, SE and CE. Significances were found for SP, MO, CP and PP. Specifically, students who had an Internet connection rated their participation (M= 4.83) higher than students who did not (M= 4.55) (F= 2.926; P= 0.088). However, students who did not have an Internet connection were more motivated (M= 4.129) than those who did (M= 3.791) (F= 3.583; P= 0.059). In addition, students who had an Internet connection had significantly higher current performance (CP) and prior performance (PP) (M= 2.842 and 2.909, respectively) than those who did not (M= 2.713 and 2.763, respectively) (F= 3.467 and 3.906, respectively; P= 0.063 and 0.049, respectively).

		N	Mean	Std. Deviation	F Test	
					F-ratio	F sig.
CE	Yes	366	2.4781	1.12057	.077	.781
	No	95	2.4421	1.14591		
	Total	461	2.4707	1.12468		
SP	Yes	366	4.8315	1.41157	2.926	.088*
	No	95	4.5509	1.47458		
	Total	461	4.7737	1.42768		
SA	Yes	366	4.3270	1.13246	.101	.751
	No	95	4.3684	1.14387		
	Total	461	4.3355	1.13369		
SE	Yes	366	3.7067	.89148	.382	.537
	No	95	3.7684	.76581		
	Total	461	3.7195	.86664		
MO	Yes	366	3.7914	1.55231	3.583	.059*
	No	95	4.1298	1.55384		
	Total	461	3.8612	1.55697		
UT	Yes	366	4.7561	.93475	.857	.355
	No	95	4.6579	.86990		
	Total	461	4.7359	.92170		
II	Yes	366	3.7858	.92016	.119	.730
	No	95	3.7495	.88821		
	Total	461	3.7783	.91283		
CP	Yes	366	2.8422	.59983	3.467	.063*
	No	95	2.7132	.61016		
	Total	461	2.8156	.60357		
PP	Yes	366	2.9098	.63251	3.906	.049**
	No	95	2.7632	.68936		
	Total	461	2.8796	.64659		

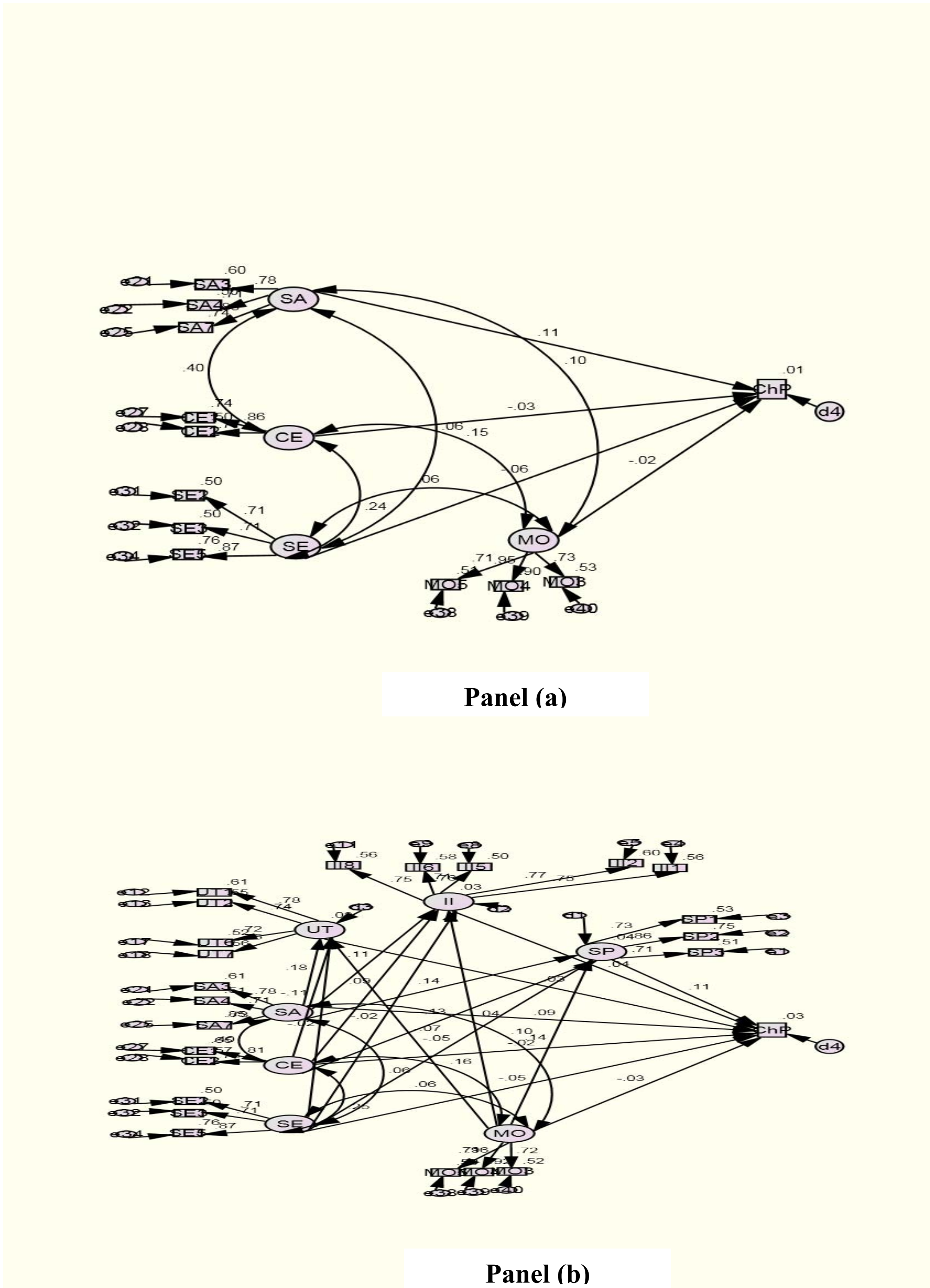
* P<0.10, **P<0.05

Table 6.19: ANOVA testing for connection to the Internet

6.11 Hierarchical regression analysis using structural equation modelling (SEM) for change in student performance (Model II)

Several studies have indicated that previous performance plays a major role in predicting future performance (Power, 1987; McKenzie & Schweltzer, 2001; Dowling et al., 2003). Thus, based on this finding, this study proposed Model II to include the change in student performance as a dependent variable instead of student current performance at the end of the semester.

Change in performance was measured using the difference between the actual performance (overall grade) at the end of the semester and the predicted performance based on the students' grades in the pre-requisite course (Accounting II). Figure 6.5 displays the standardized parameter estimates indicating the direct effects of the input variables (panel a) and both input and environmental variables (panel b). As explained earlier, measured variables are shown with a box with labels corresponding to those shown in the questionnaire. Latent constructs are shown with an oval. Each measured variable has an error termed (e) associated with it. Two headed connections indicate covariance between constructs. One headed connectors from the constructs to the indicators indicate a causal path from a construct to an indicator. One headed arrows from the construct to another construct indicate the hypothesized causal relationships. R^2 value displayed above the rectangle for change in student performance. Numbers above the one headed arrows are the standardized regression coefficient, while numbers above the two headed arrows are the correlations between the constructs.



ChP: Change in performance

Latent variables
SA: Student Attitude toward web-based learning.
CE: Computer experience
SE: Self efficacy
MO: Motivation
UT: Student perceptions of the use of technology
II: Student perceptions of the interaction of the instructor.
SP: Student participation.

These latent variables were measured through the following observed indicators

Observed Indicators
For SA are SA3, SA4, and SA7.
For CE are CE1, and CE2.
For SE are SE2, SE3, and SE5.
For MO are MO3, MO4, MO5.
For UT are UT1, UT2, UT6, and UT7.
For II are II1, II2, II5, II6, and II8.
For SP are SP1, SP2, and SP3

Those variables are shown in the questionnaire (see Table 6.6)

Figure 6.5: Standardized parameter estimates for Model II

In the first step (Figure 6.5, panel a), the four input variables were entered as a group. These variables accounted for only 1% of the variance. In the second step (Figure 6.3, panel b), the interaction variables (environmental)—namely, student participation in the web-based course, student perceptions of the use of technology and student perceptions of the interaction of instructors—were entered. They accounted for an additional 2% only of the variance. Accordingly, the input and the environmental variables failed to explain more than 3% of the variation in the change in student performance.

The commonly used measures of model fit based on the results from the analysis of the structural model are summarized in Table 6.9. All goodness-of-fit statistics were found to be in the acceptable ranges. The results indicated an acceptable fit to the data.

Accordingly, the structural equation with non-standardized regression coefficient for Model II is as follows:

$$ChP = 0.039\ SP + 0.034\ SA - 0.01\ CE + 0.012\ UT + 0.018\ II - 0.011 MO - 0.03\ SE$$

$$R^2 = 0.03 \qquad \text{Error variance} = 0.97$$

Where
ChP*: change in student performance.*
SP*: student participation.*
SA*: student's attitude toward web-based learning*
CE*: computer experience*
UT*: student perceptions of the use of technology*
II*: student perceptions of the interaction of the instructor.*
MO*: motivation*
SE*: self-efficacy*

In the above equation, the regression coefficients in the structural equation of the model were the path values. The error variance for this equation is 0.97; this value is $1-R^2$. The error variance 0.97 represented the proportion of variance in change in performance that was unexplained by input and environmental variables.

Table 6.20 represents the standardized direct, indirect and total effects implied by the model for new relationships between the input and environmental variables and the change in performance. As seen in Table 6.20, the major determinants of change in student performance were student participation in the web-based learning environment, with a total direct effect of 0.111, followed by student attitudes toward web-based learning, with a total effect of 0.110, which was mainly due to a direct effect (0.086) and partly due to an indirect effect (0.024).

Factor	Determinant	Direct effect	Indirect effect	Total effect
Change in performance (ChP)	SA	0.086	0.024	**0.110**
	MO	-0.033	0.015	-0.018
	SE	-0.053	-0.007	-0.060
	CE	-0.024	-0.013	-0.037
	UT	0.027	----	0.027
	II	0.037	----	0.037
	SP	**0.111**	----	**0.111**

Table 6.20: Standardized effects for Model II

6.12 Testing hypotheses related to Model II

Table 6.21 presents a summary of the hypotheses and indicates whether these hypotheses related to the second model (Model II) were supported. A discussion of these hypotheses follows.

Hypotheses	Result
H14: There is a positive relationship between student perceptions of the interaction of instructors and change in performance.	Not Supported
H15: There is a positive relationship between student perceptions of the use of technology and change in performance.	Not supported
H16: There is a positive relationship between student perceptions of their participation in the online environment and change in performance.	Supported
H17: There is a positive relationship between student computer experience and change in performance.	Not Supported
H18: There is a positive relationship between student self-efficacy and change in performance.	Not Supported
H19: There is a positive relationship between student attitudes toward web-based learning and change in performance.	Supported
H20: There is a positive relationship between student motivation and change in performance.	Not supported

Table 6.21: Summary of the hypotheses related to Model II

Only two hypotheses were supported: H16 and H19. The results show that student participation and student attitudes had a small direct effect on change in student performance (β= 0.11 and 0.086, respectively). In addition, the critical ratios exceeded the critical value of 1.96, with significance levels of less than 0.05 (0.018 and 0.024, respectively). The direct paths from student participation (interaction) and student attitudes toward web-based learning to change in performance were found to be significant. As a result, H16 and H19 were supported.

However, none of the remaining hypotheses was supported, as the results show a very small direct effect for the other input and environmental variables on change in student performance and the critical ratios were less than 1.96, with significance levels over 0.05. Accordingly, the direct paths from student perceptions of the interaction of instructors and student perceptions of the use of technology, computer experience, self-efficacy and motivation were not found to be significant.

Regarding the impact of the demographic variables on change in performance, an ANOVA was used to determine the influence of gender, age, computer ownership and connection to the Internet on this variable. The mean scores, standard deviations, F-ratios and the significance levels of the F-ratios are shown in Table 6.22. As seen in Table 6.22, male students (M= - 0.0616) had higher change in performance than female students (M= - 0.066), but no significant gender differences were found for change in performance (F= 0.012; P = 0.911). Moreover, students 22 and under (M = -0.062) had higher change in performance than older students (M= - 0.100), but no significant levels were found. Students who did not have a computer at home (M = -0.0156) also had higher change in performance than those who had a computer (M = - 0.0718), but no significant levels were found (F = 0.983; P = 0.322). Finally, students who did not have a connection to the Internet (M = -0.0500) had higher change in performance than those who had a connection to the Internet (M = -0.067), but no significant levels were found here either (F = 0.132; P = 0.716).

Demographic Variables	Mean	SD	F-ratio	F Sig.
Gender				
Female (n = 250)	-0.066	0.442	0.012	0.911
Male (n = 211)	-0.0616	0.402		
Age				
22 and under	-0.062	0.422	0.153	0.696
Over 22	-0.100	0.375		
Computer Ownership				
Yes	-0.0718	0.411	0.983	0.322
No	-.0156	0.475		
Connection to the Internet				
Yes	-0.067	0.409	0.132	0.716
No	-0.050	0.463		

Table 6.22: Demographic descriptive statistics and ANOVA testing results on change in performance

6.13 Summary

In the current chapter, EFA, CFA and hierarchical regression analysis using SEM techniques were used to analyse the data. EFA was used as a data summarization technique to identify the main factors that may be used in the I-E-O model as input and environmental factors that affect student performance and change in performance.

The results showed that all input factors (prior performance, student attitudes toward web-based learning, self-efficacy, computer experience and motivation) and all factors related to student interaction in the web-based environment (student participation, student perceptions of the interaction of instructors and student perceptions of the use of technology) could be used in the proposed model. CFA was performed on the hypothesized measurement model. After determining the best-fitting measurement model, convergent validity and discriminant validity were assessed. All the results indicated evidence of strong convergent validity, and no problems with discriminant validity were reported for the research variables of the measurement model.

Hierarchical regression analysis using SEM was conducted to determine if student interaction related to student participation, student perceptions of the interaction of instructors and student perceptions of the use of technology had a significant influence on student performance. The results revealed that both input characteristics and environmental interaction variables significantly affected student performance. Moreover, a second model was proposed by replacing student performance with change in performance. Then, hierarchical regression analysis using SEM was conducted on the second model to determine the importance of student interaction in change in student performance. The results indicated that none of the input or environmental variables affected change in performance significantly.

The proposed structural models were then revised and examined using SEM techniques and the proposed hypotheses tested. The results demonstrated the importance of the interaction variable in mediating the relationship between the input variables (student characteristics) and student outcome for student performance but not for change in performance.

Finally, a series of ANOVA tests was used to determine demographic (gender, age, computer ownership, and connection to the Internet) effects on the factors of the study (student participation in the web-based learning environment, student perceptions of the interaction of instructors, student perceptions of the use of technology, student attitudes toward web-based learning, motivation, self-efficacy, computer experience and prior performance).

Chapter Seven

Discussion and Conclusions

7.1 Introduction

The current study aimed to identify factors that may affect student performance in web-based learning. The Input-Environment-Outcome (I-E-O) model was applied in order to achieve this goal. The current research had two objectives. The first objective was to apply the I-E-O model proposed by Astin (1993) in the web-based learning context to examine student performance. Two variants of the model were proposed: The first variant followed the convention of previous research and used student performance as the dependent variable. The second extended previous work by using change in performance as the dependent variable. In other words, the second variant posed the more difficult question of what factors might influence how students improve their performance over what they might be expected to achieve given past performance in a given subject.

The second objective was to identify factors that affect student performance in web-based learning. Group interviews with students and instructors from the Accounting Department at the Hashemite University in Jordan were used to identify these factors. The results indicated four input variables (student characteristics) and three environmental variables related to student perceptions of interaction in web-based learning.

In order to achieve these objectives, the current research employed a mixed-methods approach. Mixed-methods research resides in the middle, because it incorporates elements of both qualitative and quantitative approaches (Creswell, 2009).The first phase used qualitative methods; the second phase extended the initial exploratory qualitative work by using a survey to collect quantitative data which was then analysed using the I-E-O model as a framework.

7.2 Study objectives

The current research aimed to investigate and identify the main factors that affect student performance in the web-based courses in Jordan. The current research had the following objectives

1- To gain a better understanding of the key terms or issues to be sure that the most important factors that may explain student performance were incorporated in the proposed models.
2- To provide some implications and recommendations to the educators at the Hashemite University in Jordan that may help in improving student performance and teaching practices in web-based accounting courses.
3- To provide some implication and recommendations to the policy makers at the Hashemite university about the appropriateness of applying the web-based learning in Accounting, and how to improve the web-based learning environment.
4- To determine the appropriateness and usefulness of applying the I-E-O model to student performance in web-based courses.
5- To determine the appropriateness of applying the I-E-O model in developing counties in general and in Jordan particularly, rather than developed countries as did the previous studies which utilized the I-E-O model.
6- To control for student characteristics (inputs) while investigating the effect of student interaction (environment) in web-based courses on student performance and change in performance.

The initial phase of this research aimed to explore the main factors that may affect student performance in web-based learning. In order to achieve this aim, the current research design started by conducting group interviews with students and instructors at the Hashemite University in Jordan. As summarized in Table 7.1, the results of the qualitative data analysis showed two dimensions (namely, input and environment), and four categories were identified for the input dimension (namely, computer experience, student attitudes toward web-based learning, motivation and self-efficacy). In addition, three categories were identified for the environmental dimension (student perceptions of the interaction in web-based learning) (namely, student participation in the web-based learning environment, student perceptions of the interaction of instructors and student perceptions of the use of technology).

Three codes of the computer experience variable were identified; namely, knowledge of electronic communication, computer expertise in Internet and Microsoft Office programmes and number of web-based courses taken. With respect to attitudes toward web-based learning, most students thought that this type of learning is fun/enjoyable, uses an attractive environment, provides new knowledge, saves time and money and allows for unrestricted study.

Two themes were identified for student motivation; namely, students thought that they could perform and learn better and that they earned new accounting knowledge. For self-efficacy, two themes were identified; namely, confidence and comfort in using the system. On the other hand, the results exhibited three interaction factors related to student perceptions of interaction in web-based learning: student perceptions of the interaction of instructors (interaction with instructors), student perceptions of the use of technology (interaction with technology) and student participation in the online learning environment (interaction with peers and content).

Dimensions	Categories	Codes
Input (student characteristics)	Computer experience	Knowledge of electronic communication, computer expertise in the Internet and Microsoft Office (i.e., Word, Excel, PowerPoint), number of web-based courses taken
	Student attitudes toward web-based learning	Web-based courses are fun/enjoyable, use an attractive environment, provide new knowledge, save time and money, allow for unrestricted study
	Motivation	To perform and learn better and to earn new accounting knowledge
	Self-efficacy	Confidence and comfort
Environment (Student perceptions of interaction in web-based learning)	Student participation in the web-based learning environment	Frequency with which the web-site is accessed, messages posted, time spent online
	Student perceptions of the interaction of instructors	Timely feedback (prompt instructor responses) and interactivity of instructors
	Student perceptions of the use of technology	Technology infrastructure (e.g., system's useful functions, Internet speed, accessibility of the network) and the ability of technology to promote the productive use of time

Table 7.1: Summary of the qualitative data analysis

Two codes were identified for student perceptions of the interaction of instructors; namely, timely feedback and interactivity of instructors. This result was compatible with the findings of most previous studies (Dennen et al., 2007; Sun et al., 2008). Two codes for student perceptions of the use of technology were identified: technology infrastructure and the ability of technology to promote productive use of time. Finally, for student participation in the online learning environment, the main themes were frequency with which the web-site was accessed, messages posted and time spent online. Accordingly, the group interviews helped in getting a better understanding of the phenomena and identifying the most important factors that may explain the student performance in web-based learning. These factors were considered inputs into constructing models for further investigation. EFA showed that all factors that were entered into the I-E-O model as input and environmental variables that may affect student performance in web-based courses were extracted, and these factors were shown to differ from one another. Accordingly, the first objective of the current study was met.

The results of the current study showed the importance of the environmental variables (student interaction in web-based learning) in mediating the relationship between input variables (student characteristics) and outcome (student performance). These findings underline that it is not the technology used in the learning process that affects student performance in web-based learning, but it is instructor interactivity and the pedagogy used in teaching the Accounting courses at the Hashemite University. So it is a matter of human interaction rather than the technology used. That student perceptions of the interaction activities in web-based learning is the crucial factor that will foster student performance. This indicates the importance of blended learning as this type of learning mixes between the traditional learning and distance learning to overcome the disadvantages of each learning environment (Delialiogh and Yildirim, 2007). Therefore combining the two learning environment will improve the quality of the learning process as this will merge the benefits provided by the traditional learning (for example social interaction between students and instructors) with those benefits provided by online learning (for example flexibility in terms of time and place, and efficiency) (Delialiogh and Yildirim, 2007; Orhan, 2007; Lim and Morris, 2009). Therefore, blended learning improved the social interaction between learners (Osguthorpe and Graham, 2003) and so overcome the main disadvantage of the online learning. Thus, the integration between face-to-face and online activities is a vital issue that will improve the learning process and so will affect student outcome positively. Accordingly, a number of implications and recommendations were outlined for educators and policy makers at the Hashemite University in order to improve social interaction, and integration between face-to-face classes and technology. These implications and recommendations might lead to improving student performance in such type of learning. Thus, the second and the third objectives were met.

Some studies in the field of student outcome research have highlighted the importance of knowing the cause of the differences between students' performance. That is, they have examined whether the variation is due to differences in student characteristics or other variables (Astin and Sax, 1998; House, 1999; Thurmond et al., 2002; Thurmond, 2003). Therefore, previous researchers have concluded that student characteristics must be controlled for (Thurmond, 2003).

The current study proposed two models: the first model used student performance as a dependent variable, while the second used change in performance as a dependent variable (see Chapter Five). The two models were accepted statistically. All of the CFA results indicated that the best-fitting measurement model was acceptable. Moreover, the results of all goodness-of-fit indices for both models were within the acceptable range (See Chapter Six). Therefore, the derived measurement models were incorporated into the analysis of SEM. The reasonable fit indices and significant model paths suggested the general application of I-E-O to explain student performance in web-based learning. Moreover, the results provided evidence of strong convergent validity for the research variables of the measurement models and provided strong evidence of discriminant validity.

Building upon the best-fitting model, the SEM model was based on the relationship proposed by Astin (1993) that environmental variables mediate the relationship between input variables and student outcome in the learning process.

Therefore, the current research extended the I-E-O model in a previously unexplored area (student performance in web-based courses) with positive results. Most of the relationships between the constructs postulated by the structural model were well supported. This provides evidence of the appropriateness of applying the I-E-O model to student performance in web-based courses. Accordingly, the fourth objective of the current study has been met.

In addition, the results strongly support the application of the I-E-O model in developing countries (rather than in developed countries, as was the case in all previous studies). The rapid increase in Internet use in the educational process (in developing countries in general and in Jordan in particular) (Market Wire, 2007) led to the acknowledgement of the probable important impact of using e-learning on student outcomes (Al-Adhaileh, 2010). In addition, the shortage of studies that have been conducted in these countries about e-learning and its effect raised the importance of studying factors that may affect student performance in e-learning to fill the gap in this field of study. Accordingly, the fifth objective has been met.

The current study applied the I-E-O model to web-based learning and used hierarchical regression analysis using SEM to evaluate the extent of which input and environmental variables affect performance and change in performance. In this technique the relationship between the input factors (student characteristics) as a group was examined firstly, and then the environmental variables (student perceptions of the interaction activities in web-based courses) as a group were entered to the model secondly. The initial entry of the input variables helped control for the influence of these variables on student performance, which allowed for a stronger interpretation of the causal inferences regarding the environmental variables (Astin, 1993). Accordingly, the sixth objective has been met.

7.3 Study findings and conclusions

The study's two models fit the data, and it was reasonable to test the models in terms of path significance. The first model was identified as a model with goodness-of-fit that explained student performance in web-based courses. Thus, it was anticipated that the I-E-O model would provide a strong explanation of performance in web-based courses. It was found that input variables (particularly prior performance and student attitudes toward web-based learning) were the most significant, direct input factors affecting student performance. In addition, it was found that environmental variables (particularly student participation in web-based courses and student perceptions of the interaction of their instructors) also had a significant direct effect on student performance. It was also found that computer experience, motivation and attitudes of students toward web-based learning played a major role in student interaction in web-based learning.

The second model was identified as a model with goodness-of-fit and attempted to explain the change in student performance. Only two factors were found to have a direct effect on change in student performance: student attitudes toward web-based learning (input) and student participation in web-based courses (environment). This indicates that students with positive attitudes toward web-based learning participated more in the web-based courses, which was reflected in their improved performance. Accordingly, the results of the current study showed the importance of the environmental variables (student interaction) in mediating the relationship between input variables (student characteristics) and outcome (student performance).

The current study differs from most previous studies that used only student performance in their models, as it also included change in performance in another model. This study explained 73% of the variance in student performance but failed to explain more than 3% of the variation in change in performance. Two reasons may have caused this failure. Firsly, the independent variables (input and environmental variables) were measured at the end of the web-based course, while change in performance (dependent variable) was measured using a longitudinal measure (difference between student performance in the pre-requisite course and performance in the current course). Measuring the independent variables using longitudinal measures may provide better results (e.g., change in student participation in the online learning environment, change in student perceptions of the interaction of the instructor, change in motivation, and change in student attitudes toward web-based learning). Secondly, change in performance was measured using the difference between the student mark in the prerequisite course (Accounting II) and his mark in the studied courses (Intermediate Accounting or Managerial Accounting). Using a pre-test exam at the beginning of the web-based course and a post-test exam at the end of the same web-based course may indicate stronger results. As this will measure the change in student performance in the same course not in two different courses.

The final model of this study provided support for the idea that student perceptions of the interaction activities that occur in web-based learning help directly to explain student performance. This is consistent with a number of previous studies, which have suggested that environmental variables have a significant influence on student outcomes (Campbell & Blakely, 1996; Astin & Sax, 1998; House, 1999; Zheng et al., 2002; Thurmond, 2003; Strayhorn, 2008). Interaction is considered a basic component of a good education (Chickering & Gamson, 1987). In addition, it is believed that interaction is the core element of the virtual classroom (Thurmond, 2003). Therefore, interaction is considered one of the most important environmental variables in web-based learning that influences student outcome (Thurmond et al., 2002; Thurmond, 2003).

7.3.1 Relationship between environmental variables and student performance and change in performance

The results of the current study indicated that the interaction variables (environmental) accounted for a significant proportion of the performance variance but not the change in performance variance after controlling for the effect of student characteristics (inputs). Table 7.2 summarizes the findings of the current study regarding the effect of each one of the environmental factors (student perceptions of interaction activities in web-based learning) on student performance and change in performance as well the consistency or inconsistency of these findings with the previous studies and is followed by a discussion of these findings.

Findings	Consistency (inconsistency) with the findings of prior studies
Significant, direct effect of student participation in the online learning environment on student performance	Consistent with Novitzki (2000), Wang & Newlin (2000), Wang et al. (2001) and Alstete & Beutell (2004)
Student perceptions of the interaction of instructors had a significant, direct effect on student performance	Consistent with Webster & Hackley (1997), Jiang & Ting (1999) and Swan (2001)
Student perceptions of the use of technology had no effect on student performance	Consistent with Leasure et al. (2000) and Kenny (2002) but inconsistent with Webster & Hackley (1997) and Thurmond (2003)

Table 7.2: Summary of the study findings regarding the effect of the environmental factors on student performance

7.3.1.1 Student participation in the online learning environment

In this research, student participation in the web-based learning environment is defined as the frequency with which the course web-site is accessed and messages are posted to the discussion board as well as time spent working on course content. The results of the current study showed a significant and direct effect of this factor on student performance, which is consistent with a number of previous studies (Novitzki, 2000; Wang & Newlin, 2000; Wang et al., 2001; Alstete & Beutell, 2004). A small significant, direct effect was also found between this factor and change in student performance in Model II.

There are several reasons why students with higher performance participate more. Firstly, they may feel that they work more independently when posting messages to other students to clarify certain points or to answer questions. They may do so for students who are accustomed to accessing the web-site frequently to catch what they missed in class or to find answers, explanations and summaries posted by other students. Secondly, this may be due to the extra material some instructors put on their web-sites (e.g., extra problems and quizzes), which encourages students to access the web-site more often and interact with each other to find the best solution for these problems. Students who perform well are usually more eager to access such materials in order to improve their performance as much as they can. Thirdly, students who perform well may enjoy forums added by instructors for discussion, especially when these forums are related to the exams, as instructors usually add forums before and after each exam. Finally, in some courses, participation is graded and monitored by instructors; therefore, good students participate more to boost their grades.

7.3.1.2 Student perceptions of the interaction of instructors

Despite the fact that web-based learning is a form of self-study, instructors in this type of learning context play a major role in facilitating the learning process for their students. In the current study, student perceptions of the interaction of instructors were found to have a positive effect on student performance but not change in performance, which is consistent with prior studies (Webster & Hackley, 1997; Jiang & Ting, 1999; Swan, 2001). This may be due to the fact that the Hashemite University (the case of the current study) uses blended learning, as there are weekly face-to-face meetings conducted between the instructors and students to discuss the major issues regarding the material uploaded. Thus, students will perceive instructor interaction as positively affecting their performance. Moreover, the punctual feedback instructors provide students regarding exam and assignment performance improves student learning and accomplishment. Dennen et al. (2007) reported similar findings in their study of the perceptions of 170 students and 32 instructors regarding the importance of 19 online interaction activities done by instructors to student performance. The results indicated that all students and instructors highlighted the importance of this factor to student performance.

7.3.1.3 Student perceptions of the use of technology

Another factor investigated in the current study was student perceptions of the use of technology (interaction with technology), which was defined as student perceptions of the availability and reliability of technology and the Internet and the ability of technology to promote effective use of time. Student perceptions of the use of technology were not found to have an effect on student performance. Results indicated that even if students have negative perceptions of technology, it does not inhibit performance, which is consistent with the findings of previous studies (Leasure et al., 2000; Kenny, 2002). However, this finding is inconsistent with the findings of Thurmond (2003), who found that students who claimed that the use of technology was not a waste of time tended to have better outcomes (i.e., higher satisfaction). In addition, this result is inconsistent with the findings of Webster and Hackley (1997), who found that the quality of technology has a positive effect on student outcome. One possible explanation for this is that the students in the current study had face-to-face contact with their peers and instructors, which helped them to acquire what they needed for their studies. Accordingly, this would minimize the effect of technology on their performance. Thus, even if students reported that use of technology is a waste of time, this would not affect their performance.

7.3.2 Relationship between input variables and student performance and change in performance

The results of the current study indicated that student characteristics (input variables) accounted for a significant proportion of the performance variance but not the change in performance variance. Table 7.3 summarizes the findings of the current study regarding the effect of each input variable on student performance in web-based learning as well as the consistency or inconsistency of these findings with the previous studies and is followed by a discussion of these findings.

7.3.2.1 Prior performance

As expected, it was found that prior performance had a strong and direct effect on student performance, which is consistent with most of the previous studies that have suggested that prior performance is the main predictor of the current performance of students (McKenzie & Schweltzer, 2001; Dowling, 2003; Roberts & Dyer, 2005).

Findings	Consistency (inconsistency) with the findings of prior studies
Prior performance had a significant, direct effect on student performance.	Consistent with McKenzie & Schweltzer (2001), Dowling (2003) and Roberts & Dyer (2005)
Students' computer experience was found to have no effect on student performance.	Consistent with Shih et al. (2006) but inconsistent with Shany & Nachamis (2001) and Arbaugh & Duray (2002)
Student motivation did not have an effect on student performance.	Inconsistent with Shih & Gamon (2001) and Roberts & Dyer (2005)
Student attitudes toward web-based learning had a significant, direct effect on student performance.	Consistent with Sankaran et al. (2000) and Sivo et al. (2007)
Self-efficacy did not have any significant effect on student performance.	Inconsistent with Wang & Newlin (2002), Ergul (2004) and Liu et al. (2004)

Table 7.3: Summary of the study findings regarding the effect of the input factors on performance

7.3.2.2 Computer experience

The current study did not find any relationship between computer experience and student performance, contrary to the findings of Shany and Nachamis (2001) and Arbaugh and Duray (2002). However, this result is consistent with the findings of Shih et al. (2006), who determined that prior computer experience does not affect student outcome. This may be due to the technical support available in web-based courses. Moreover, students become more experienced in this type of learning as they progress in the course, which enables them to overcome their frustration with the system and participate in the programme. Another possible explanation is that some students do not find it necessary to access the web-site frequently, as they can depend on their friends to provide them with the necessary material and do not feel that this factor makes a difference in their performance.

7.3.2.3 Student motivation

On the other hand, the results showed a weak, insignificant effect of student motivation on performance or change in performance, contrary to the findings of more than one study (Shih & Gamon, 2001; Roberts & Dyer, 2005). This was a surprising finding due to the fact that students' motivation to earn knowledge or learn and perform better does not affect their performance. That is, even if students are motivated to earn better grades or obtain new knowledge, this does not affect their performance. But this finding was consistent to the finding of other research in the field of accounting (Eskew & Faley, 1988; Gul & Fong, 1993) these studies did not find any association between motivation and student learning outcome. This may be due to the nature of the subject of accounting (which is related more to complex, practical issues than to simple problems), which forms an obstacle to achieving better performance for some students.

7.3.2.4 Student attitudes toward web-based learning

Student attitudes toward web-based learning was found to be one of the key factors that affected student performance and change in performance, which is compatible with the findings of previous studies (Sankaran et al., 2000; Sivo et al., 2007). This may be due to the fact that if students find web-based learning to provide an enjoyable environment, save time, provide new accounting knowledge, and help in obtaining good grades, this is reflected positively in student performance.

7.3.2.5 Self-efficacy

Another input characteristic that was examined in the current study was student self-efficacy. Contrary to previous studies (Wang & Newlin, 2002; Ergul, 2004; Liu et al., 2004), the current study did not show any significant effect of this factor on student performance or change in performance. This may be due to the simplicity of the system used (Blackboard), as it does not require complicated skills or knowledge. It makes it easier for students if their instructors conduct an induction session at the beginning of each semester where students can learn how to use the system effectively. In addition, students become experienced in using the system during other courses. Moreover, this may be due to the fact of using the blended leaning at the Hashemite University (the case of the current study) as this type of learning mixes face-to-face and web-based instruction. This makes students more comfortable and confident in using the system, as they can find support from their peers and instructors. Therefore, even if students do not feel confident or comfortable in using the system, this does not affect their performance negatively, as they can easily obtain support from their peers and instructors.

7.3.3 Relationship between input and environmental variables

Table 7.4 summarizes the findings of the current study regarding the relationship between input variables (student characteristics) and the environmental factors (student perceptions of interaction activities in web-based courses) as well the consistency of these findings with the previous studies and is followed by a discussion of these findings.

7.3.3.1 Prior performance

The findings of the current study showed that the prior performance of students had a significant and direct effect on student participation in the online learning environment. This indicates that students who participated more in the web-based activities (e.g., accessing the web-site frequently, posting messages to the discussion board and spending time on the course) had better prior performance. This finding is consistent with the findings of Hsu et al. (2003), who found that the prior ability (GPA) of students was the only predictor of student participation in the online learning environment.

Moreover, it is noteworthy that the path value from student prior performance to student perceptions of the interaction of instructors had a strong and direct effect. In addition, this indicates that students who achieved better performance in the prerequisite course perceived the interaction of their instructors more favourably than those who achieved lower performance in the prerequisite course. This may be because students with good prior performance are more active than students with lower prior performance. Therefore, they receive punctual feedback about their inquiries and responses from their instructors regarding their performance on the assignments, quizzes and exams, which leads them to develop a positive perception of the interaction with their instructors unlike students who received lower grades in the pre-requisite course.

Findings	Consistency with the findings of prior studies
Prior performance of students had a significant, direct effect on student participation in the web-based learning environment.	Consistent with Hsu et al. (2003)
Students' computer experience had a significant, direct effect on student participation in web-based learning.	Consistent with Vrasidas & McIsaac (1999) and Zafeiriou et al. (2001)
Student attitudes toward web-based learning had a significant and direct effect on student perceptions of the use of technology.	Consistent with Hong et al. (2003)
Student motivation had a significant, direct influence on student perceptions of the use of technology.	Consistent with Rodriguez et al. (2008)
Self-efficacy was not found to have an effect on student perceptions of interaction activities in the web-based learning environment.	Consistent with Hsu et al. (2003) and Liu et al. (2008)

Table 7.4: Summary of the study findings regarding the effect of the input factors on the environmental factors

7.3.3.2 Computer experience

The current study also revealed that students' computer experience has a significant and direct effect on student participation in the online learning environment. This is consistent with the findings of Vrasidas and McIsaac (1999), who found that prior experience with computer-mediated communication (CMC) technology, is one of the major factors influencing student participation. In addition, the finding is also consistent with the results of a study conducted by Zafeiriou et al. (2001), who found that students' familiarity with computers positively affects their participation in CMC. A possible explanation for this relationship is that students with high computer experience usually interested in obtaining more benefits from the learning management system (Blackboard).

7.3.3.3 Motivation

The current study found that student motivation has an important direct influence on student perceptions of the use of technology in learning (perception of interaction with technology). This is consistent with the findings of Rodriguez et al. (2008), who indicated that students with higher motivation were more satisfied and that this positively affected their perceptions of the quality of technology used in online courses. One possible explanation for this is that students who were expecting to do well in the course, interested in the content of the course and preferred course material that aroused their curiosity perceived the use of technology as an important and reliable method of learning.

7.3.3.4 Student attitudes toward web-based learning

The study model showed that student attitudes toward web-based learning had a significant and direct effect on student perceptions of the use of technology). This is consistent with the findings of Hong et al. (2003), who found a significant, direct relationship between student attitudes toward using the Internet for learning and their perceptions of the learning environment in assisting and promoting the learning process. This result was not surprising, as students with positive attitudes toward web-based courses would naturally see the technology used in the learning process as an effective method for the learning process.

7.3.3.5 Self-efficacy

Self-efficacy was not found to have an effect on student perceptions of interaction in the web-based learning environment. This finding is consistent with the findings of Liu et al. (2008), who examined the effect of self-efficacy on the interaction of 46 students enrolled in a web-based computer course. They found that student interaction (student logs of frequency and time spent on an online discussion forum) was not affected by student self-efficacy.

7.3.4 Demographic differences in the study's factors (ANOVA)

Finally, the current study tested the differences between students with respect to their gender, age, ownership of a computer, and connection to the Internet.

7.3.4.1 Gender

The results showed significant gender differences only in the students' perceptions of the interaction of their instructors. Female students perceived the interaction of their instructors better than male students. This is consistent with the findings of a number of studies (Fisher & Rickards, 1997; She and Fisher, 2002; Frumkin, 2006) that female students usually perceive their learning environment better than males and so they rate their instructors' interaction better than males (Fisher et al, 1995). This might be due to the availability of an interesting learning environment that combines face-to-face activities and online activities. Another finding of the current study revealed that there were no significant gender differences for participation in the online learning environment. This finding was surprising as some studies have indicated that the Arab culture and traditions limit interaction between the two genders (Al-Harthi, 2005; Azaiza, 2010), but in the current study these two limitations did not affect the female students' participation. This might be due to the use of anonymous participation in the online learning environment. Nevertheless, this finding was consistent with some Western studies which indicated that both genders usually participate equally in the web-based learning environment (Mclean & Morrison, 2000; Poole, 2000; Davidson-Shivers et al, 2003). However, it was inconsistent with other Western studies (Arbaugh, 2002; Gunn et al, 2003; Coldwell, 2008) which indicated that female students usually participate more than male students in the online learning environment. another reason may have caused this insignificant gender differences for participation in the online learning environment in the current study that the students might feel that their online activities are monitored by their instructors, so they want to show their interactivity, especially if their participation is graded and mandatory.

Moreover, the current study did not find significant gender differences for performance, which is contrary to the findings of several studies (Gunn et al, 2003; Alstete and Beutell, 2004;

Coldwell et al, 2008) which indicated that females usually outperform males. These studies indicated that the main reason for this significant difference is that females are usually more motivated and they have more ability to work independently than males, which is reflected positively in their performance. However, in the current study this was not found as there were no significant gender differences for motivation. Nevertheless, this finding was consistent with a number of studies in the field of accounting (Carpenter et al., 1993; Keef & Roush; 1997; Montondon & Eikner, 1997; Monem, 2007). These studies found insignificant gender differences for performance. Accordingly, this study supports the prior studies results in that gender does not have any relationship with student performance in accounting courses.

7.3.4.2 Age

Significant age differences were found for motivation only in that younger students were more motivated than older students. This result is consistent with the finding of Justice and Dornan (2001), who found that, in general, younger students were more motivated to achieve better. It is also consistent with the findings of Hedberg (2010), who found that younger students were more motivated to learn more than older students on training courses. But this finding is contrary to the argument that says older students usually more motivated to achieve better than younger students because older students usually have better experience and sometimes they have more ability to adopt a rigorous learning approach (Monem, 2007). Justice and Dornan (2001) explained the significant age differences for motivation in favour to younger student in that older students are more motivated to achieve better in their overall academic performance but not in a particular course. This is the case in the current study as the motivation measures focus on motivation to achieve better in a specific accounting course not in the whole accounting degree programme. Another explanation for this finding is that the population of the older students was very low as the majority of the participants (96 per cent) were young (less than 22). These reasons might also have caused the insignificant age differences for performance and participation in the online learning environment.

7.3.4.3 Computer ownership and connection to the Internet

The results of the current study indicated that students who owned a PC and had a connection to the Internet performed significantly better than those who did not. This is consistent with the findings of Sankaran and Bui (1999), who found that students who owned a PC and had access to the Internet performed significantly better than those who did not.

Moreover, the results revealed that computer ownership and the availability of a connection to the Internet at home contributed to a significant difference in participation in the online learning environment. This result was unsurprising as the availability of these two factors is essential for online participation.

7.4 Study implications

The current study can be very beneficial to educators in universities that offer web-based courses, because the study model can help to explain the factors underlying student performance in web-based courses. In addition, it can provide insight into the relationship between the input factors (student characteristics), the environmental variable (interaction in web-based learning) and outcome (performance). The research findings indicated strong relationship between two environmental factors and student performance in web-based courses namely, student perception of the interaction of instructors and student participation in the web-based learning environment. These findings underline that it is not the technology used in the learning process that makes a difference in student performance in web-based learning, but it is instructor interactivity and the pedagogy used in teaching the Accounting courses at the Hashemite University. This pedagogy focuses mainly on collaborative learning by presenting the subject's content in a structured way and giving students the chance to discuss this content face to face and online with each other and the instructor. Thus, improving instructor interaction with students and interaction among students are more important in promoting improved performance than improving technology. Therefore, integration between teaching practices and technology (online learning) using the blended learning at the Hashemite University is a crucial issue in fostering student performance. This is not to say that technology is unimportant or that it can be ignored. However, the functionality, usability and reliability of e-learning technology have rapidly improved to the point where questions of how it is deployed and exploited become more important than what it is capable of doing. Accordingly, the discussion of implications of the current study will focus on pedagogic and policy issues.

7.4.1 Implications for instructors

The current study results revealed that student perceptions of the interactivity of instructors and students' participation in the online learning environment had strong direct effects on students' performance. Therefore, instructors must keep these two factors in mind and try to develop their interactivity with students in order to enhance student perceptions of their interaction (and so to improve their students' performance). In addition, instructors must find ways to boost students' participation in the online learning environment. The following sections present different techniques and tactics should be followed by instructors to improve these two factors that may improve students' performance.

7.4.1.1 Student perceptions of the interaction of instructors

There are several techniques can be followed by the instructor to improve student perceptions of the interaction of instructors, such as providing students feedback that is timely, extensive and constructive; improving communication with students; designing an effective web-based course; and providing information about technical requirements.

7.4.1.1.1 Timely, extensive, and constructive feedback

Feedback by the instructors of the web-based courses should be considered an important factor that enhances student perception of the interactivity of the instructor. Therefore, this feedback must be qualitative one in the sense of time and component. This can be done by providing timely, extensive, and constructive feedback for students regarding their performance on assignments, exams and quizzes. This will help students to recognise their mistakes and misunderstanding in early stage before the feedback loses its capacity in affecting their understanding and so performance. It is important to show explicitly in the syllabi of web-based course the time of feedback and how long it takes to respond. This will make students less confused regarding the timing of the feedback. Any unannounced delay in the instructor's providing of feedback might cause students to become suspicious or confused about their performance. Therefore, instructors must inform their students about any expected delay in the feedback and the reasons if possible. This will give students better impression of their instructors' interactivity, as they will feel that their instructors are genuinely concerned with their performance.

Moreover, feedback must be extensive and constructive, in that it should include the weak points of the student performance in assignments and exams that need strengthening and correct answers, in addition to positive feedback. Moreover, instructor feedback must address ways students can develop a better understanding of the material. This can be done by identifying the misunderstood ideas, questions, or problems, and then sending them the key answers, advising them to solve related web-based problems and exercises and to conduct collaborative discussion with others. This may improve student understanding of the ideas and content and so enhance student perceptions of the interaction of the instructor and so their performance.

7.4.1.1.2 Communication with students

Instructors should also respond to student inquiries, establishing timely meetings with students to discuss different issues. These meetings must be carefully planned and conducted in the sense of timing and content. This will make students feel that instructors are accessible and they can discuss any issue with them, which will improve students' perceptions of their instructor interactivity (and, thus, students' performance). Moreover, instructors should send reminders to their students regarding different issues related to their courses, such as the due date of their assignments, exam dates, etc. Also, instructors can remind students to log on to the Blackboard system on a weekly basis, and ask students to use the digital drop box to submit assignments. Moreover, instructors can make frequent announcements to the students to inform them about the up-to-date news and activities related to their courses (e.g. new materials uploaded, and required material for exams), and to check the grade book to see their grades.

Also, instructors should allow students to send them personal e-mails to discuss personal problems, thoughts, or future plans they don't want to discuss publically on the discussion board. Similarly, contacting students by name will make them feel that they are close to the instructor, especially if the instructor uses informal greeting phrases. Another effective tactic that can be used by instructors to enhance students' perception is to send them follow up e-mails regarding their latest discussion. This will give students a strong impression that their instructors are genuinely concerned about them. Also sending them greeting and best wishes on public occasions and their personal events (e.g., birthdays) will boost students' perception of their instructors' interactivity.

7.4.1.1.3 Design of the web-based course

The instructors should provide an early introduction about the course on the website as well as informing the students about what is expected from them throughout the duration of the web-based course, such as the level of the online participation in the course (e.g. times of logging in, duration of entries, and number of posted messages).

Additionally, as the Hashemite University (the case of the current study) is applying the blended learning that mixes face-to-face and online interaction, it is very important to plan carefully for the face-to-face classes to take advantages of the presence of both the students and the instructors. This could be done by designing activities that provide integration of the face-to-face and online discussion, such as asking indirect questions, and distributing critical problems and cases to be discussed briefly in the classroom and then in more detail online. These activities should be synchronised carefully to prevent any repetition or overlapping. Extending the classroom discussion to online discussion would improve the students' perceptions of the interaction of their instructors.

The instructors should present the material of their web-based courses using a variety of file formats (e.g. Word and Excel documents, PowerPoint slides, videos, audio clips, images and charts) and they need to adopt a variety of teaching methods (e.g. online discussion, online group work, collaborative learning and case studies). This would help the instructors to meet all possible differences in the students' learning styles and would thus improve the students' perceptions of the interaction of their instructors.

In addition, the instructors need to provide updated materials and links on the website. These links should be related to professional Accounting certificates (e.g. Certified Public Accountant (CPA), Certified Internal Auditor (CIA), Certified Management Accountant (CMA)) and the financial data for different local or international companies. The updated materials and links would make the students feel that their instructors are concerned about their knowledge in their field, either academic or professional, which might enhance their perception of the interaction of their instructors.

7.4.1.1.4 Providing information about technical requirements

It is important that the instructors prepare and post a list of technical requirements needed to access the web-based material (e.g. PDF, Microsoft Office, Media Player, MP3 and MP4) and they must inform the students about the steps in downloading the required software. Similarly, the instructors must post information on the website about the person or department to contact in case of any technical problems. This would help any students who face technical difficulties in accessing the web-based material, especially those who are not experienced in using computers.

7.4.1.2 Students' participation in the online learning environment

The instructors must pay more attention to student participation and encourage the students to participate more in online activities as this factor had a significant direct effect on student performance. Several strategies could be followed to foster the students' participation, such as mandatory presentations, online discussions, participation in online quizzes, and group projects and assignments. For example, the instructors could assign part of the final grade to online participation activities, provide additional material to help students in their studies or add extra links to interesting websites related to their course and profession to encourage them to access the website more often to obtain more benefits from what is uploaded. Moreover, the instructors could make the grade of the online quizzes part of the final mark.

In addition, the instructors could monitor the students' activities on the website using the tracking system available in the Blackboard system and encourage those with low levels of participation to participate more. This could be done, for example, by involving them in online group discussions, group assignments and peer assessments to incentivise these students to participate more. A suggested tactic that could be used by the instructors to foster the students' participation is to announce a weekly list of the highest participants in the online activities.

Another essential point is that the instructors must go beyond text interaction using the discussion board and emails. This could be done by utilising online chat programs (e.g. Skype and MSN Messenger) and the effective use of the e-learning resources provided by the university such as the Virtual classroom system (Elluminate) that enables live communication between instructors and students. This would provide incentives for students to participate more, especially in the case of the accounting courses which depend more on practical issues than theoretical ones, as texts alone might not help the students to get a better understanding of the idea or the subject as a whole. In this kind of program both texts and visual explanations could be used. Another way to foster the students' participation would be to allow them to use the Arabic language or codes in their online participation. This would make the students more relaxed when expressing their ideas and thoughts because Arabic is the native language in Jordan.

Special attention must be given to the students with poor performance in the prerequisite course as the current study found that the path value from prior performance to student performance and participation in web-based courses had the strongest direct effect value. This result indicated that the students with better performance in the prerequisite course might have better participation with peers and content and might perform better as a result. This is compatible with most of the previous studies that indicate that prior performance is the best indicator of current performance (McKenzie & Schweltzer, 2001; Dowling, 2003; Roberts & Dyer, 2005) and participation in the web-based learning environment (Hsu et al., 2003). Therefore, the educators must pay closer attention to students who come with low grades in the prerequisite course by engaging them more in online activities that might improve their participation, such as peer assessments and group assignments. They should also encourage them to participate in discussion forums regarding the content of the material by posting messages to obtain feedback from their classmates. This could be done by involving these students more in the participation process by giving them the opportunity to select the idea to be discussed from a list of ideas or any idea they prefer. Moreover, the instructors might request from these students that they respond to at least one other student as a mandatory activity. In addition, they should inspire them to do the online quizzes, extra problems and previous exams uploaded onto the website and to discuss these uploaded materials with their friends. This could be done by assigning higher mark of the final mark to those students' online participation. Another tactic that could be used by the instructors is to match weak students with stronger achievers in one group for online group assignments and projects. This might boost their participation and thus their performance.

In addition, educators must be sure that students have enough computer experience before they enrol in the web-based course, as this factor has been found to have a direct, significant effect on student participation in the online learning environment. The literature focused on the importance of having basic computer experience in order to successfully participate in web-based learning (Zafeiriou et al., 2001). This can be done by making a special course related to computer essentials a prerequisite course for the web-based course so that students earn the minimum level of computer skills needed in such learning.

7.4.2 Implications for policy makers

The current study revealed several implications for the policy makers in web-based learning in general and those at the Hashemite University specifically. Several policies can be applied in order to develop e-learning, to promote staff development, to support student access, and to enhance students' attitude toward web-based learning.

7.4.2.1 Developing e-learning

The Hashemite University utilises several advanced technologies that provide strong support for the e-learning environment. These resources include the learning Management System (Blackboard), the Virtual Classroom System (Elluminate), the Assessment Management System (Questionmark), class recoding tools (Tegrity), and authoring tools (Lectora).The availability of all of these resources makes the Hashemite University very useful in providing effective e-learning. Therefore, and due to the rapid increase in student enrolment at the university as well as the high demand on the Jordanian universities the policy makers at the Hashemite University must think about developing new policies for offering distance learning to those students who live overseas and don't have the ability to join the university physically due to personal circumstances (e.g. family and work) as the university only offers blended learning.

The availability of all of these effective resources that improve the interactivity of students and instructors will make offering a distance learning program very successful and will be helpful in providing qualitative learning. Offering distance learning will help the university to improve its revenue. This will enhance the university's ability to invest in more e-learning resources and will improve its infrastructure by increasing the number of labs and computers, as well as supporting students who have financial problems to be able to afford the cost of connecting to the Internet and even own their own PC or Laptop as the current study results indicated significant differences of the computer ownership and connection to the Internet for performance and online participation.

The web-based courses, and the technology used to support these courses, must be evaluated continuously in order to determine its flexibility in meeting the students' and instructors' needs. This could be done by conducting workshops and conferences and by collaborating with lead universities in the field of e-learning. Doing this would help the university to explore others' experience of e-learning and thus help it to improve in e-learning.

7.4.2.2 Staff development

The educators need to focus on staff development to improve the integration between the technology used and the teaching practices. This could be done by providing short training courses for instructors in order to improve their skills in using the e-learning resources available at the university. This would provide the instructors with teaching skills in order to foster the students' interaction. Furthermore, these training courses must improve the instructors' ability to decide which course objectives can be achieved face-to-face and which can be achieved online. By doing this, the best integration between the two learning environments could be accomplished.

Another strategy that could be followed by the university is to reward the instructors for innovative practices in the web-based learning or even to make these practices part of the evaluation process of the instructors' performance. This might make the instructors more enthusiastic about improving their teaching and designing skills.

Moreover, due to the increased time needed by the instructors in web-based learning for designing the course and interacting with the students, the policy makers must study the possibility of reducing the workload of the instructors. Reducing the workload would make the instructors more effective in interacting with their students and it would give them the opportunity to develop their web-based courses and to learn more teaching skills through training courses. This could be done by reducing the number of students in the class, decreasing the number of face-to-face meetings between the students and the instructors, and by transferring more of the face-to-face activities to the online environment.

The staff development could also be improved by encouraging the staff to share their online practices and experiences through workshops, seminars and conferences, and by supporting them with advanced technology such as voicemails and podcasts. This would encourage the instructors to be active online. Consequently, this might incentivise the students to increase their online interactivity, thus improving their performance.

7.4.2.3 Supporting student access

Very important questions that must be taken into consideration and addressed are whether every student has the financial ability to afford the cost of connecting to the Internet, and whether the use of the blended learning favors one set of students over another. Therefore, the university must set a policy to support the students with the required resources in order to engage them more in the learning process especially those who don't own a personal computer and don't have connection to the Internet at home. This could be done by extending labs time beyond 5 p.m. and by opining some of the university's labs at weekends in addition to support them financially to enable them to connect to the Internet and to buy their own computers and they may lend computers to those students who can't afford its cost . In addition, they may sign agreements with Internet providers to provide students with Internet services at low prices.

Another important issue here is that the university must evaluate the flexibility and the capacity of its server in order to avoid any technical problems that the students might face in accessing their courses that might frustrate them.

7.4.2.4 Improving students' attitudes towards web-based courses

Since the students' attitudes towards web-based learning were identified as having a significant direct effect on the students' performance and changes in performance, the universities and the educators must consider this factor and adopt a policy in order to improve the students' performance and ensure the success of web-based courses. To improve the students' attitudes towards web-based learning, the universities could conduct extensive induction courses to highlight the simplicity and benefits of the learning system used, such as saving time and money, unrestricted study (in terms of time and place) and an attractive learning environment that takes advantage of virtual classrooms (Elluminate), an assessment management system (Questionmark), class recoding tools (Tegrity), videos, audio clips, up-to-date lecture notes, and online quizzes. Highlighting these resources and advantages might improve the student's attitudes, which would affect their interaction positively and in turn perhaps enhance their performance.

Another strategy that could be used by the university in order to improve the students' attitudes towards web-based learning is to support them financially by covering the cost of connection to the Internet, and to support them practically by providing them with suitable and extensive training on using the available resources.

In summary, the adoption of explicit policies and strategies in web-based learning have become very important due to the rapid changes in the learning environment and the need for the university to determine how to achieve its goals and objectives. Policies related to the improvement and development of the web-based learning, staff development, students' access and attitudes might help the educators to improve the learners' performance.

7.5 Study contributions

This work is original, firstly in that the work is conducted in the context of a developing country. Secondly, the research extends the domain of the I-E-O model to context of web-based learning. Thirdly, the study uses the I-E-O model to attempt to explain changes in student performance as well as levels of performance. Fourthly, the work extends the use of SEM in researching e-learning. These contributions are discussed in the following sub-sections.

7.5.1 Conducting the analysis in the context of developing country (Jordan)

The most important contribution of the current study is that it conducted the analysis in the context of a developing country (Jordan). Currently, e-learning is used extensively in the education systems of the majority of the world's countries. In the developing countries (including Arab ones), the Internet has spread rapidly, especially in Saudi Arabia, Kuwait, UAE, Jordan and Egypt (Market Wire, 2007). Therefore, despite challenges, e-learning initiatives have been undertaken in the Arab world (Abouchedid, 2004). The rapid growth in the use of the latest technologies, computers and networks in Jordan's public and private universities has led to the acknowledgement of the probable important influence of e-learning on the learning outcomes of students (Al-Adhaileh, 2010). The key source of originality here is that very few studies have been undertaken in developing countries in e-learning in general and student performance in web-based learning in particular. Therefore, this study will fill the gap in the literature regarding the effect of using web-based learning on student performance in Jordan and will provide the basis for further research in developing countries on student performance in web-based learning. The study also adds to collective knowledge of the effects of e-learning by adding a case study set in a new context to the existing range of studies. In doing so it broadens the scope of research on e-learning effectiveness.

Moreover, the current study contributes in providing a recommendation for the policy makers in Jordan to revisit its regulation of adopting e-learning in Jordan (60% should be traditional and 40% synchronous and asynchronous learning through technology). According to the current research findings the most important factors in the e-learning environment are the interaction practices by the instructors and students rather than technology or the prescription of particular levels of technology application. The effectiveness of e-learning, according to this study and many others, is largely determined by non-technological factors. Policy makers should direct their attention to ways of improving the integration between the teaching practices and technology, particularly in the area of promoting instructor and student interactivity.

7.5.2 Extending the domain I-E-O model in the context of web-based learning

An important contribution of the current study is that it extends the domain of the I-E-O model to student performance in web-based courses. The current study investigates factors that affect student performance and change in performance in the context of web-based learning. This model was applied limitedly in the context of e-learning (Thurmond et al., 2002; Thurmond, 2003). Thurmond's two studies are the only studies that have applied the I-E-O model to examine web-based courses (Thurmond & Popkess-Vawter, 2003) these studies investigated student satisfaction with online learning; however, the current study investigated student performance and change in performance in web-based courses.

7.5.3 Using the I-E-O model in an attempt to explain changes in student performance as well as levels of performance.

Two contributions distinguish the current study from other studies. Firstly, previous studies only investigated student performance at the end of the learning process as the main construct, but the current study investigated both student performance and change in performance (in absolute terms) to obtain a better understanding of the factors that may affect student performance in web-based courses. Secondly, none of the previous studies applied the I-E-O model in the context of web-based courses to investigate student performance, as did the current study.

The proposed models of the current study investigated and entered to the I-E-O model various input variables (e.g., prior performance, computer experience, self-efficacy, motivation, and student attitudes toward web-based learning). These variables are considered important factors that affect performance in web-based courses (Mckenzie & Schweltzer, 2001; Shih & Gamon, 2001; Piccolo, 2001; Sankaran & Bui, 2001; Wang & Newlin, 2002; Dowling, 2003; Thompson & Lynch, 2003; Ergual, 2004; Koohang, 2004; Al-Khadash & Abuloum, 2005; Roberts & Dyer, 2005; Liu et al., 2008). Moreover, student perceptions of the interaction activities in web-based courses (student perceptions of the interaction of instructors, student participation in the online learning environment and student perceptions of the use of technology) were entered into the I-E-O model as environmental variables. Interaction is considered the core element of an effective learning environment, and it is the main component of a good education (Thurmond, 2003). According to the researcher's knowledge and literature review, these factors have not previously been integrated into one framework to test their relationship with learner performance in the e-learning context.

7.5.4 Using SEM

Another contribution of this study is using SEM to revise and examine the proposed models and to test the study hypotheses. Using this technique in the analysis process distinguishes this study from other studies that have applied the I-E-O model, in that previous studies only used hierarchical regression analysis as a means of data analysis. SEM has the ability to estimate a complete model, incorporating both measurement and structural consideration (Hair et al., 2010). As mentioned earlier this technique was used due to its advantages over regression analysis.

7.6 Generalizability of the study's findings

An important question is whether these findings can be generalized beyond the specific research site, for example to subjects other than accounting, other universities, other developing countries and to different groups of students. In statistical terms this is a question of whether the study sample is representative of one or more wider populations. On a more realistic basis it is useful and sensible to consider the findings in the wider context of other studies, the theoretical background and the researcher's own professional experience. The question then becomes whether or not the findings are useful to subjects that are similar to accounting in the skills they require and their logical structure. It is also useful to consider applicability to subjects where similar pedagogies to the one used by teachers in this study have been deployed. Is the Hashemite University different from other universities in the types of students it attracts and their expectations of what learning and teaching at the university might entail?

From the researcher's knowledge and experience the current study findings can be generalized to other subjects that have fundamentally similar pedagogy to accounting used to teach the accounting subjects of the current study (see Chapter One), that focus mainly on collaborative learning by presenting the subjects' content in a systematic manner and giving students the chance to discuss this content face to face and online. But it might not be generalized to other subjects that have different pedagogy such as enquiry based learning[1], and problem-based learning[2]. These pedagogies focus on problems from the practice in the learning process (Kahn and O'Rouke, 2005) rather than the subject content which contrasts the pedagogy used in accounting courses at the Hashemite University.

But can we generalize the current study findings to other universities in Jordan that utilize web-based learning? The universities in Jordan are similar in the type of students they have, which is due to more than one reason. Firstly, the majority of students enrolled in Jordanian universities are full-time students because according to the regulations of the Ministry of Higher Education (MHE) in Jordan the educational system of these universities is mainly designed for full-time students who are required to attend their classes on a regular base. Secondly, students in each discipline in these universities are almost similar in their academic ability as the regulations of the Ministry of Higher Education specify the minimum grade point average (GPA) in high school for different disciplines to be accepted in the Jordanian universities. For example for medicine and dentistry schools the minimum high school GPA is 85%, for engineering it is 80%, and for other majors it is 65% (http//:www.mohe.gov.jo). Finally, students in these universities share the same culture as 90% of the students enrolled are Jordanian (Al-Adhaileh, 2010). Another reason that might support the similarity of the universities in Jordan that use web-based learning is that these universities follow the same

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[1] In this pedagogy learners are responsible for exploring an idea or a question to understand a concept individually or part of a group (Kahn and O'Rouke, 2005)

[2] Students in problem-based learning are considered the centre of the educational process by focusing on what is learned by students rather than what is taught by teachers. Students are encouraged to investigate scientific, realistic, and ill-structured problems in order to learn by finding a proper solution (Barett, 2005).

regulations set by the Ministry of Higher Education relating to the adoption of blended learning (60% traditional and 40% using technology to provide synchronous and asynchronous learning). Accordingly, these universities use the same teaching strategies in their web-based learning. In summary, the similarity of the student mix in Jordanian universities and the adoption of the same regulations regarding students' acceptance and teaching strategies implies the similarity between these universities and so the possibility of generalizing the findings of the current study to those universities that apply web-based learning and use the same pedagogy used in accounting subjects at the Hashemite University.

On the other hand, can the study findings be generalized to other developing countries? The majority of developing countries are facing similar challenges in their higher education such as lack of funds, infrastructure, and a rapid increase in the number of students. This has made developing countries think seriously about e-learning in order to overcome these problems and to provide education to a wider group of students (World Bank, 2000). Jordan also faces the same problems as the increasing number of students in Jordan's universities (from 30,000 students in 1985 to more than 190,000 in 2008) caused a major cost problem for these universities (Alkhadash and Abuloum, 2005). In addition, it is estimated that the number of students who will enter universities will increase to approximately 92,000 annually by 2013 from 50,469 in 2005 (World Bank, 2009). Therefore, in Jordan e-enabled delivery is widely seen as a possible means of resolving these tensions through the development of web-based courses (Alkhadash and Abuloum, 2005) The use of technology in education in Jordan and other developing countries such as Egypt, UAE, Kuwait, and Saudi Arabia is growing rapidly (AL-Adhaileh, 2010), and Jordan is one of the first developing countries to adopt e-learning in its educational system in order to achieve the royal vision of making Jordan a technology hub and an e-learning model in the region (Al-Adhaileh, 2010). Accordingly, the similarity of the circumstances that most of the developing countries share could make other developing countries get the benefits of the Jordanian experience when they intend to apply e-learning in their educational system (Mofleh et al., 2008). For example, Al-Radhi (2010) in his article that reviewed e-learning in Iraq recommended benchmarking the Jordanian experience and the experiences of other developing countries in order to set the strategies and polices needed to apply successful e-learning in Iraq.

In conclusion, the previous argument would imply the possibility of generalizing the findings of the current study to other developing countries that have similar circumstances and strategies to Jordan.

7.7 Limitations of the study

Despite the significant findings revealed by the study results and the important implications drawn, the following limitations were acknowledged:

1. The proposed model for change in student performance had a very low R^2 value, which implies that the input and environmental variables explained only 3 per cent of the variance in change in student performance. This may be due to the differences in measuring the dependent and independent variables, in that the dependent variable (change in performance) in the second model was measured using a longitudinal measure (difference between student performance in the prerequisite course and performance in the current course), while the input and environmental variables were measured at the end of the web-based course. Measuring the input and environmental variables using longitudinal measures as well (for example, change in the input and environmental variables) may improve the explanatory power of the study's model. Additionally, this failure might be due to measuring the change in performance by the difference in the students'

marks in two different courses (Accounting II and Intermediate or Managerial Accounting). Using the results of pre- and post-tests in the same web-based course to measure change in student performance may improve the explanatory power of the change in student performance.

2. Other factors that have not been examined in this study may influence student participation and performance in web-based learning. Inclusion of other relevant factors (e.g., class size, high school GPA, availability of the Internet at home, Internet speed, instructor's attitude toward web-based learning and level of study, individual learning styles, and subjective norms) may improve the study's model and result in a model with more explanatory power.
3. Student participation in the online learning environment was self-reported; that is, students expressed their perceptions of their participation, which might have been imprecise. Future research should use a more objective measure of student participation (i.e., the student tracking tool available from the online learning system).
4. Student performance and change in performance were measured using only one indicator, the student's overall grade awarded at the end of the semester. Using other measures (e.g., added knowledge, skill building, course withdrawals and successful completion of a course) may lead to more powerful results.
5. Self-efficacy in the current study was defined as the students' evaluation of their confidence, ability and comfort using the Blackboard system. This definition does not encapsulate the concept of digital literacy which focuses on measuring the user's ability to use, analyse, evaluate and understand information using digital technology. It has been indicated that self-efficacy cannot be an indication about

the user's digital literacy (Hargittai, 2005). Therefore, if the current study had included measures of the digital literacy instead of the self-efficacy, this might have provided different results.

7.8 Recommendations

According to the study results, the current research provides the following recommendations for educators and for further research.

7.8.1 Recommendations for educators

1. Because student participation in the online learning environment was the most important environmental factor that affected student performance in web-based courses, the educators must pay more attention to this factor. Therefore, they should monitor students' activities and participation on the course's website using the tracking feature available in the Blackboard system. This would provide the educators with early indicators of students who are facing difficulties with their studies, especially those students who come with low performance in the prerequisite course, because the students' prior performance was found to be the most significant factor that affected both student participation and student performance in the web-based course. Using a proactive measure to identify those students with expected low performance would be much more beneficial than using a reactive measure after they have performed badly, as this may improve their academic performance. Therefore, the adoption of more than one technique and tactic to boost student participation in the online learning environment is both necessary and essential.

2. Closer attention must be focused on students' perceptions of the interaction of their instructors, as this factor was found to have a significant direct effect on student performance, by improving the instructors' feedback, the communication with students, the design of the web-based course, and providing information about the technical requirements.
3. Students' characteristics must be carefully considered at the beginning of the web-based course, especially attitude toward web-based learning, as this factor was found in the current study to have a significant, direct effect on student performance. This can be done by concentrating on the major features of web-based learning, such as the availability of the discussion board, digital drop box to submit assignments and other reports, e-mails, videos for recorded lectures and up-to-date lecture notes. This would show students the advantages they can get from this type of learning, which may improve their attitudes toward web-based learning as well as their performance.
4. Policies for developing staff are needed to improve the instructors' teaching skills in order to develop an efficient use of each of the available e-learning resources and the face-to-face meetings by conducting effective training courses and workshops. This will help the university to achieve the best integration of the two learning environments in its blended learning, which will foster students' interaction and thus their performance.
5. Policies and procedures must be adopted by the Hashemite University in order to help the instructors to improve their interaction with their students by reducing the instructors' workload, rewarding the instructors for innovative practices in the

web-based learning environment, and providing them with advanced technology (e.g. voicemails and podcasts).

6. It is important for the policy makers at the university to set policies in order to help the students with access to the Internet that will enhance their online participation by supporting them financially, lending them personal computers, negotiating with Internet providers to obtain low Internet prices for the students, extending lab time, and opening some labs at weekends.
7. Extensive induction and training courses are recommended for the students in order to improve their skills in using the e-learning resources and to enhance the students' attitudes toward web-based learning.
8. It is strongly recommended that the Hashemite University offers distance learning for overseas students or even for those Jordanian students who live a long way from the university, as the university has good e-learning resources that guarantee the success of this programme.
9. It's recommended that the Ministry of Higher Education and Scientific Research in Jordan to revise its regulations regarding accrediting the blended learning (60% traditional and 40% synchronous and asynchronous learning using technology). As the current research found that the most important factors in the e-learning environment are the interaction practices by the instructors and students rather than technology or the prescription of particular levels of technology application. Therefore, policy makers should direct their attention to ways of improving the integration between the teaching practices and technology, particularly in the area of promoting instructor and student interactivity.

7.8.2 Recommendations for further research

1. This research provided the basis for additional research in developing countries related to student performance in web-based courses, as this study developed and validated a structural model in order to measure the main factors that affect student performance.
2. Further research is needed in order to improve the explanatory power of the variation in the change in student performance. This could be done by improving the measures of the independent and dependent variables. Measuring input and environmental variables (independent variables) using longitudinal measures (for example, the change in the input and environmental variables) might improve the explanation of the change in student performance. Additionally, using a better measure for the change in student performance (for example, the difference in the students' marks in pre- and post-tests in the same web-based course) might enhance the study results.
3. Student performance in the second model of the current study was predicted using the student grade in the pre-requisite course (Accounting II). Accordingly, the dependent variable in Model II (change in performance) was measured by calculating the difference between the predicted and actual performance. Using another method to predict student performance might improve the second model results. For example, this can be done by conducting a regression analysis for the new mark at the end of the semester and student mark in the prerequisite course. This will determine the proportion of the variance in the new mark explained by the old mark, and then the residual value can be plugged into the model as the relative performance change.

4. Further research should entail a comparative study to compare student performance across all levels of study, as this may provide a better explanation of student performance.
5. It is recommended that further research should use a probability sampling technique (e.g. random sampling), as this will eliminate the bias caused by the current study's convenience sample and will increase the generalizability of the findings.
6. Future research should employ another measure for student performance (e.g., added knowledge, successful completion of a course), as this may provide different indications.
7. Caution should be taken when interpreting the difference in motivation between older and younger students due to the relatively small number of older students in the present study. Future studies must strive to get a much higher number of older participants than in the current study.
8. The current study utilized the I-E-O model; other models (e.g., Tinto's model, Pascarella's model) could be used to investigate the data.
9. The current study applied on a blended learning approach, which mixes traditional and web-based forms of instruction. Repeating the same study in a completely online learning context (Distance learning) might expand upon the results.

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Appendix A: The English Instrument

Faculty of Business, Environment and Society

Coventry University

Dear Student,

This study is designed to investigate the factors that affect students' performance in web-based courses in the accounting department at the Hashemite University. It forms part of a PhD research program being undertaken at Coventry University, UK. Would you please spend a few minutes to complete this questionnaire to help me?

Further information on my research and the role of the questionnaire is given in the participant information sheet. All questionnaire data will be kept confidential and all responses will be anonymous, that is it will not be possible to link questionnaire answers to individuals.

Many thanks for your support.

Researcher,

Abdullah Al-Hadrami

e-mail: hadramia@coventry.ac.uk

Your student ID:………………………………………………..

SECTION (1):

Please respond to the following items by circling the appropriate number

1. **Gender?**

(1) Male (2) Female

2. **Age?**

(1) Less than 20 years (2) From 20 to 22 years

(3) From 23 to 25 years (4) Greater than 25 years

3. **Occupation:**

(1) Not working (2) Part-time worker (3) Full-time worker

4. **Place of residence**

(1) Amman (2) Zarqa (3) Irbid

(4) Mafraq (5) Other, specify …………..

5- **Status**

(1) Single (2) Married (3) Other

6- **Your course title**

(1) Intermediate Accounting (2) Managerial Accounting

7- **Do you have computer at home**:
(1) Yes (2) No

8- **At home, do you have connection to the internet?**

(1) Yes (2) No

9 - **On average, regardless of whether you posted a message or not, how often did you access the course's website each week.**

(1) Never (2) Once a week (3) Twice a week

(4) Three times a week. (5) Four times a week   (6) five times a week

(7) Six times or more a week

10- **On average how often did you post a message to the discussion board each week?**

(1) Never   (2) Once a week   (3) Twice a week

(4) Three times a week. (5) Five times a week   (6) Six times a week

(7) Seven times or more a week

11-**On average, how many hours per week have you spent for this course? Include time spent reading, completing projects and assignments, and discussing the course content with the instructor or classmate.**

(1) 1-5 hours   (2) 6-10 hours   (3) 11-15 hours

(4) 16-20 hours   (5) 21-25 hours   (6) 26-30 hours

(7) More than 30 hours

12. **How many web-courses have you taken prior to taking this course?**

(1) None   (2) One   (3) Two

(4) Three   (5) Four   (6) Five

(7) More than five

13- **Using a rating scale of 1 to 7 rate your knowledge of how to use the electronic communications technology at the beginning of this web-based course? So if you did not have any knowledge please circle number 1, if you were expert circle number 7. Circle other numbers as appropriate for other levels of knowledge.**

None — **Expert**

1	2	3	4	5	6	7

14- **Using a rating scale of 1 to 7 rate your level of computer expertise at the beginning of this web-based course? So if you did not have any expertise please circle number 1, if you did have excellent experience circle number 7. Circle other numbers as appropriate for other levels of computer experience**

Poor						Excellent
1	2	3	4	5	6	7

SECTION (2):

Using a rating scale of 1 to 7, please circle the number that indicates your level of disagreement/agreement with the following statements. So if you "strongly disagree" circle number 1. If you "strongly agree" circle number 7. Circle other numbers as appropriate for other levels of agreement and disagreement.

No.	ITEM	**Strongly disagree**				**Strongly agree**		
	Attitude							
1-	Web-based learning is fun	1	2	3	4	5	6	7
2-	Web-based learning provides an attractive learning environment.	1	2	3	4	5	6	7
3-	Web-based learning helps me to obtain good grades.	1	2	3	4	5	6	7
4-	I enjoy web-based learning	1	2	3	4	5	6	7
5-	Web-based learning provides me with new accounting knowledge	1	2	3	4	5	6	7
6-	Web-based learning is an educational method of economic benefit	1	2	3	4	5	6	7
7-	Web-based learning saves my time	1	2	3	4	5	6	7
8-	Web-based learning allows me to learn freely by using my own time	1	2	3	4	5	6	7
	Self efficacy							

9-	I feel comfortable with the Blackboard system	1	2	3	4	5	6	7
10-	I am confident of using the Blackboard system even if there is no one around to show me how to do it.	1	2	3	4	5	6	7
11-	I am confident of using the Blackboard system even if I have never used such a system before.	1	2	3	4	5	6	7
12-	I am confident of using the Blackboard system as long as someone shows me how to do it.	1	2	3	4	5	6	7
13-	I am confident of using the Blackboard system as long as I have a lot of time to complete the job for which the software is provided.	1	2	3	4	5	6	7
	Motivation							
14-	I want to get better grades than other students	1	2	3	4	5	6	7
15-	Studying appropriately, I can learn the material.	1	2	3	4	5	6	7
16-	I expect to do well in this class.	1	2	3	4	5	6	7
17-	I am interested in the content area of this course.	1	2	3	4	5	6	7
18-	I prefer course material that arouses my curiosity	1	2	3	4	5	6	7
19-	I can postpone current enjoyment (for example watching a game) so that I can study for my test.	1	2	3	4	5	6	7
20 -	I feel I am the person responsible for how well I do in this class.	1	2	3	4	5	6	7

21-	I am a good time manager and always find the necessary time to study							
	Perception of use of Technology							
22-	I waste too much time communicating with others on topics that are not directly related to my course work.	1	2	3	4	5	6	7
23-	I waste too much time sorting through my messages to find the few that are useful.	1	2	3	4	5	6	7
24-	I spend too much time trying to log on to the University's Blackboard system.	1	2	3	4	5	6	7
25-	I miss important information because the technology does not work correctly	1	2	3	4	5	6	7
26-	I feel the information technologies used in e-learning are very easy to use.	1	2	3	4	5	6	7
27-	I feel the information technologies used in e-learning have many useful functions	1	2	3	4	5	6	7
28-	I feel satisfied with the speed of the Internet.	1	2	3	4	5	6	7
	Instructor's interaction							
29-	I receive comments on assignments or examination for this course in a timely manner.	1	2	3	4	5	6	7
30-	My instructor provides an extensive feedback.	1	2	3	4	5	6	7
31-	My instructor provides examples on the course web-site.	1	2	3	4	5	6	7
32-	My instructor responds to my inquiries.	1	2	3	4	5	6	7

33-	My instructor establishes synchronous meeting times.	1	2	3	4	5	6	7
34-	My instructor check on students' access to course materials.	1	2	3	4	5	6	7
35-	My instructor checks our e-mails frequently	1	2	3	4	5	6	7
36-	My instructor ensures availability of technical support	1	2	3	4	5	6	7

Appendix B: The Arabic Instrument

أعزائي الطلبة:

يرجى التكرم بمنحي بعض الوقت للإجابة على هذا الاستبيان، عن هذا الاستبيان تم تصميمه كجزء من رسالة دكتوراه بهدف التعرف على العوامل المؤثرة على أداء الطلبة في مواد المحاسبة المدعمة بمواد تعليمية معدة عن شبكة المعلومات.

إن مشاركتكم في هذا الاستبيان تعتبر مهمة جدا لتحقيق الغاية من هذا البحث لذا فإننا نرجو منكم الإجابة على جميع فقرات هذا الستبيان بأقصى دقة ممكنة علما بأن جميع الستبيانات والبيانات سوف تعامل بسرية تامة ولأغراض البحث العلمي الأكاديمي فقط.

وشكرا جزيلا

عبدالله الحضرمي

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الجزء الأول : المعلومات الشخصية

الرقم الجامعي..

يرجى اختيار الاجابة المناسبة مما يلي:

1- الجنس: ☐ ذكر ☐ أنثى

2- العمر:

☐ أقل من 20 عاما ☐ من 20 الى 22 عاما

☐ من 23 الى 25 عاما ☐ أكبر من 25 عاما

3-العمل:

☐ لا أعمل ☐ أعمل بدوام جزئي ☐ أعمل بدوام كامل

4- مكان الاقامة:

☐ عمان ☐ الزرقاء ☐ اربد ☐ المفرق

☐ غير ذلك ....

5- الحالة الاجتماعية:

☐ أعزب ☐ متزوج ☐ غير ذلك

6- المادة التي تدرسها حاليا

☐ المحاسبة المتوسطة ☐ المحاسبة الادارية

7- هل يوجد لديك كمبيوتر في المنزل

☐ نعم ☐ لا

8- هل تشبك على الانترنت من المنزل

☐ نعم ☐ لا

9- كم مرة عادة تزور موقع المادة بغض النظر عما اذا كنت تقوم بوضع رسائل على منتدى المناقشة ام لا

☐ ولا مرة ☐ مرة اسبوعيا ☐ مرتين اسبوعيا

☐ ثلاث مرات اسبوعيا ☐ اربعة مرات اسبوعيا ☐ خمسة مرات اسبوعيا

☐ ستة مرات او أكثر اسبوعيا

10- كم مرة اسبوعيا عادة تقوم بوضع رسائل على منتدى المناقشة؟

☐ ولا مرة ☐ مرة اسبوعيا ☐ مرتين اسبوعيا

☐ ثلاث مرات اسبوعيا ☐ اربعة مرات اسبوعيا ☐ خمسة مرات اسبوعيا

☐ ستة مرات او أكثر اسبوعيا

11- كم ساعة بالمتوسط تستهلكها لدراسة هذه المادة اسبوعيا؟ شاملا وقت القراءة، الواجبات، ومناقشة محتوى الملدة مع زملائك:

☐ 5-1 ساعات ☐ 10-6 ساعات ☐ 15-11 ساعة

☐ 20-16 ساعة ☐ 25-21 ساعة ☐ 30-26 ساعة

☐ ست مرات او اكثر

12- كم ماده مدعومه بال Blackboard System انهيت قبل المادة الحالية

☐ لاشئ ☐ مادة واحدة ☐ اثنتان

☐ ثلاث ☐ اربع ☐ خمس

☐ اكثر من خمس

13- يرجى وضع دائرة حول الرقم المناسب لتقيم معرفتك حول استخدام تكنولوجيا الاتصالات الالكترونية مثل برامج المحادثه مع بداية دراستك لهذة المادة حيث 1 تعني انه لم يكن لديك اية معرفة بينما رقم 7 تعني انه كان لديك الخبرة الكافية.

بدون معرفة						خبير
1	2	3	4	5	6	7

14- يرجى وضع دائرة حول الرقم المناسب لتقيم مستواك في استخدام الحاسب الالي مع بداية دراستك لهذه المادة

ضعيف						ممتاز
1	2	3	4	5	6	7

الجزء الثاني: العوامل المؤثرة على تحصيل الطالب في المواد المدعمه بموقع الكتروني

يرجى وضع دائرة حول الرقم المناسب للفقرات التالية للتعبير عن مدى موافقتك او عدم موافقتك حيث 7 تعني اوافق بشدة و 1 تعني لا اوافق بشدة

الرقم		غير موافق بشده				اوافق بشدة		
-1	التعليم الالكتروني مريح	1	2	3	4	5	6	7
-2	التعليم الالكتروني يعتبر بيئة تعليمية جاذبة	1	2	3	4	5	6	7
-3	إن نظام الدراسة المزود بمواد تعليمية على شبكة المعلومات ساعدني في الحصول على علامات جيدة.	1	2	3	4	5	6	7
-4	أستمتع بالتعليم بهذا الأسلوب	1	2	3	4	5	6	7
-5	التعليم الالكتروني يوفر لي معرفة محاسبية جديدة	1	2	3	4	5	6	7
-6	التعليم الاكتروني له مزايا اقتصادية	1	2	3	4	5	6	7
-7	ان التعليم الالكتروني على توفير الكثير من وقتي	1	2	3	4	5	6	7
-8	يساعدني التعليم الالكتروني على التعلم بحرية وبالوقت الذي يناسبني	1	2	3	4	5	6	7
-9	أشعر بارتياح عند استخدامي لنظام ال Blackboard	1	2	3	4	5	6	7
-10	لدي الثقة الكاملة بنفسي في استخدام نظم ال Blackboord حتى وإن لم يساعدني أحد.	1	2	3	4	5	6	7
-11	لدي الثقة الكاملة بنفسي في استخدام نظام الBlackboord حتى وإن لم أستخدم هذا النظام من قبل.	1	2	3	4	5	6	7
-12	أثق بنفسي في استخدام نظام ال Blackboord لطالما يوجد أحد يساعدني في ذلك.	1	2	3	4	5	6	7
-13	لدي الثقة في استخدام نظام الBlackboord طالما لدي الوقت الكافي لذلك.	1	2	3	4	5	6	7
-14	أريد الحصول على علامات أفضل من الطلاب الآخرين.	1	2	3	4	5	6	7
-15	يمكنني تعلم المادة التعليمية إذا قمت بالدراسة بشكل مناسب.	1	2	3	4	5	6	7
-16	أتوقع الحصول على علامات جيدة في هذه المادة.	1	2	3	4	5	6	7
-17	أنا مهتم بمحتوى هذه المادة	1	2	3	4	5	6	7
-18	أفضل المواد التي تثير فضولي	1	2	3	4	5	6	7
-19	أعمل على تأجيل الاستمتاع الحالي(على سبيل المثال مشاهدة مباراة) لكي أتمكن من الدراسة.	1	2	3	4	5	6	7
-20	أنا المسؤول الوحيد عن مدى أدائي في المادة	1	2	3	4	5	6	7
-21	ادير وقتي بشكل جيد واجد الوقت الضروري للدراسة	1	2	3	4	5	6	7
-22	اضيع وقتي بالتواصل مع الاخرين حول مواضيع ليست لها علاقة بمحتوى المادة	1	2	3	4	5	6	7
-23	اضيع الكثير من وقتي بالبحث عن الرسئل المفيدة	1	2	3	4	5	6	7

-24	اضيع الكثير من الوقت لكي ادخل على الBlackboard	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-25	تفوتني معلومات مفيدة بسبب ان التكنولوجيا لاتعمل بشكل جيد	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-26	اشعر بان تقنية المعلومات المستخدمة في نظام التعليم الالكتروني سهلة الاستخدام.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-27	اشعر بان تقنية المعلومات المستخدمة في نظام التعليم الالكتروني تقدم العديد من المزايا المفيدة.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-28	أن مقتنع بسرعة الانترنت	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-29	أحصل على تعليقات حول أدائي بالواجبات والامتحانات بشكل سريع من المحاضر	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-30	يقوم المحاضر بتوفير تعليقات شاملة	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-31	يقوم المحاضر بالاستجابة على طلباتي	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-32	يقوم المحاضر بعمل لقاءات وجها لوجه	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-33	يقوم المحاضر بالاستجابة على طلباتي	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-34	يقوم المحاضر بمتابعة دخول الطلبة لموقع المادة	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-35	يقوم المحاضر بمتابعة رسائلنا الالكترونية بشكل مستمر	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-36	يقوم المحاضر بالتأكد من توفر معلومات حول الدعم الالكتروني	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Appendix C: Correlation matrix

	SP1	SP2	SP3	CE1	CE2	CE3	SA1	SA2	SA3	SA4	SA5
SP1	1.000										
SP2	.497	1.000									
SP3	.399	.685	1.000								
CE1	-.294	-.301	.303	1.000							
CE2	-.344	.229	.310	.578	1.000						
CE3	.101	.110	.009	.474	.545	1.000					
SA1	.050	.018	.101	.204	.282	.227	1.000				
SA2	-.023	-.021	.002	.280	.330	.337	.497	1.000			
SA3	.303	.319	.339	.329	.320	.317	.666	.497	1.000		
SA4	.310	.342	.316	.386	.383	.249	.652	.476	.531	1.000	
SA5	.006	.003	.012	.221	.299	.355	.611	.459	.714	.550	1.000
SA6	.001	.019	.074	.236	.327	.306	.615	.452	.702	.587	.661
SA7	-.306	.320	.315	.363	.309	.281	.604	.479	.670	.582	.710
SA8	.002	.011	.040	.286	.333	.315	.392	.492	.681	.593	.689
SE1	.113	.082	.112	-.028	-.062	.239	.223	-.386	.009	.057	-.009
SE2	.305	-.223	.307	-.379	-.329	-.217	-.327	-.290	-.334	-.331	-.300
SE3	.325	.317	-.301	-.438	.346	-.006	.208	.375	.422	.354	.343
SE4	.105	.104	.003	.033	.210	.220	.317	-.087	-.018	-.034	-.067
SE5	-.309	-.327	-.331	.349	-.313	.034	.047	-.029	-.322	-.329	-.080
MO1	-.256	-.092	-.088	.019	.000	-.101	.208	-.337	-.001	-.034	-.243
MO2	.003	.369	.080	.054	.357	-.041	.016	.217	.032	.209	-.010
MO3	-.302	-.333	.322	.243	.334	-.307	.319	-.303	.379	.316	.011
MO4	.303	.317	.329	.376	.393	-.121	.015	.047	.401	.325	.306
MO5	.319	.309	.323	.340	.375	-.024	.420	-.321	-.305	.307	-.023
MO6	-.001	.025	.075	.023	.047	-.065	.015	-.029	.043	-.004	-.029
MO7	.051	.033	.067	.046	.018	-.042	.351	-.051	.039	.052	.417
MO8	.030	.041	.066	.036	.040	-.035	.009	.008	.022	.001	-.050
UT1	-.306	-.416	-.306	.383	.333	.320	.075	.095	.422	.370	.163
UT2	.314	.316	.325	-.305	.024	.009	-.043	.032	.303	-.236	.303
UT3	-.029	-.239	-.042	-.036	-.037	-.009	.302	.343	.020	.047	.341
UT4	-.079	.001	.061	.127	.146	.310	.071	.028	.018	.067	.106
UT5	-.119	-.043	-.048	.003	.072	.056	-.001	.028	.074	.023	.080
UT6	-.326	.326	-.302	.332	.356	.080	.059	.321	.426	.419	.105
UT7	.334	.340	.327	.335	.380	.328	.067	.078	.073	.302	.111
II1	-.311	.301	.310	.054	.110	.324	.324	.398	.094	.130	.116
II2	.305	.303	.337	.300	.336	.082	.105	.363	.424	.407	.130
II3	.032	-.020	.016	.079	.113	.123	.150	.335	.214	.217	.210
II4	-.121	-.049	-.023	.135	.078	.087	.079	.240	.111	.121	.103
II5	-.317	-.309	.235	.383	.335	.045	.062	.347	.341	.416	.080
II6	.304	.325	-.305	.078	.076	.029	.032	.322	.073	.040	.311
II7	-.100	-.061	-.060	.121	.173	.417	.333	.373	.190	.177	.218
II8	.318	.344	.324	.328	.322	.090	.342	.229	.314	.369	.301
PP	-.029	-.055	-.082	-.049	.049	-.033	-.063	-.009	-.050	-.018	-.022

Correlation matrix (continued)

	SA6	SA7	SA8	SE1	SE2	SE3	SE4	SE5	MO1	MO2	MO3
SA6	1.000										
SA7	.668	1.000									
SA8	.682	.672	1.000								
SE1	-.023	-.014	-.228	1.000							
SE2	-.354	-.300	-.250	.637	1.000						
SE3	-.202	.323	.356	-.470	-.401	1.000					
SE4	-.003	-.370	-.244	.488	.456	-.426	1.000				
SE5	.307	-.051	-.344	.575	.378	-.326	.408	1.000			
MO1	.201	-.054	-.035	-.074	.018	.042	.095	.026	1.000		
MO2	-.205	.038	.015	-.260	-.055	.081	.350	-.020	.540	1.000	
MO3	.011	.336	.328	-.319	-.459	.317	-.004	-.360	.528	.709	1.000
MO4	-.216	.342	.023	-.040	-.333	.304	.361	-.313	.507	.862	.710
MO5	.016	.414	-.320	-.321	-.343	.310	.051	.318	.459	.787	.661
MO6	.020	.014	.012	-.402	-.031	.055	.080	-.038	.469	.841	.731
MO7	.333	.042	-.302	-.033	-.048	.019	.062	.016	.477	.480	.413
MO8	-.021	.030	-.205	-.360	-.078	.102	.409	-.026	.523	.872	.723
UT1	.365	.346	.133	-.010	-.315	.309	-.025	-.332	-.033	-.026	-.305
UT2	-.032	-.421	.030	.314	.328	-.317	-.004	.306	-.352	-.029	-.384
UT3	.343	-.017	.356	-.009	.035	.033	.359	-.057	-.311	-.354	-.032
UT4	.037	.114	.401	.358	.086	-.070	.075	.022	-.073	-.001	.032
UT5	.091	.073	.378	.226	.051	.105	-.009	-.048	.076	.303	.033
UT6	.329	.368	.383	-.039	-.349	.104	-.013	-.328	-.303	.050	.405
UT7	.068	.431	.340	.012	.323	.307	-.030	-.203	-.055	-.035	-.249
II1	.353	.307	.326	-.030	-.321	.306	-.301	-.384	.365	.327	.367
II2	.307	.441	.257	-.307	-.351	.224	-.061	-.310	.318	.332	.372
II3	.374	.225	.355	-.023	-.083	.179	-.122	-.102	-.040	-.043	-.008
II4	.290	.109	.330	-.301	-.051	.153	-.316	-.044	.303	.078	.345
II5	.051	.363	.224	-.231	-.336	.324	-.074	-.232	-.311	-.414	.305
II6	.336	.239	.268	.035	.305	.233	-.046	-.028	.350	.367	.346
II7	.378	.200	.402	-.077	-.057	.117	-.083	-.065	.208	-.301	.059
II8	.253	.394	.375	-.211	.307	.322	.302	-.310	.042	.378	.335
PP	-.076	-.016	.008	-.026	.030	-.021	-.074	-.001	-.030	-.062	-.021

Correlation matrix (continued)

	MO4	MO5	MO6	MO7	MO8	UT1	UT2	UT3	UT4	UT5	UT6
MO4	1.000										
MO5	.711	1.000									
MO6	.785	.681	1.000								
MO7	.426	.494	.347	1.000							
MO8	.798	.764	.815	.384	1.000						
UT1	-.322	-.059	-.320	.343	-.325	1.000					
UT2	-.045	-.016	-.008	-.202	-.011	.378	1.000				
UT3	-.012	-.061	-.229	-.018	-.354	.358	.107	1.000			
UT4	.303	-.307	.034	.041	-.011	.373	.162	.147	1.000		
UT5	-.012	-.005	.310	.017	.025	.732	.336	.388	.447	1.000	
UT6	.029	.303	.019	.301	.035	.499	.236	.090	.358	.347	1.000
UT7	-.043	-.055	-.029	.009	-.341	.469	.135	.388	.496	.351	.471
II1	.090	.042	.362	.306	.078	.041	.070	.037	.207	.006	-.029
II2	.339	.326	.026	.027	.301	.052	-.013	.325	-.331	.350	.013
II3	-.031	-.050	-.049	-.324	-.019	.121	.052	.054	-.023	.081	.362
II4	.087	.065	.308	.037	.089	.030	-.010	.008	-.010	.316	.320
II5	-.011	-.051	-.027	-.029	-.309	.271	.043	.056	.303	.027	-.024
II6	.391	.060	.330	.320	.049	.029	-.013	.123	-.008	.006	-.430
II7	.026	-.337	-.020	.322	.305	.316	.090	.085	.311	.321	.329
II8	.382	.252	.319	.230	.323	.070	.049	.359	.363	.013	.022
PP	-.061	-.018	-.090	-.040	-.042	.027	.042	.010	.032	.052	.012

	UT7	II1	II2	II3	II4	II5	II6	II7	II8	PP
UT7	1.000									
II1	.305	1.000								
II2	.306	.537	1.000							
II3	.292	.524	.594	1.000						
II4	-.004	.483	.901	.495	1.000					
II5	.306	.452	.507	.691	.453	1.000				
II6	-.317	.374	.473	.370	.429	.389	1.000			
II7	.040	.472	.526	.778	.529	.676	.379	1.000		
II8	.315	.387	.415	.362	.397	.383	.303	.360	1.000	
PP	-.033	-.002	.088	.115	.067	.112	.091	.098	-.045	1.000

Appendix D: Anti-image Correlation

	SP1	SP2	SP3	CE1	CE2	CE3	SA1	SA2	SA3	SA4	SA5
SP1	.596[a]										
SP2	-.336	.574[a]									
SP3	-.054	-.620	.602[a]								
CE1	.069	-.010	.005	.800[a]							
CE2	-.018	-.047	.042	-.396	.800[a]						
CE3	-.031	.021	.008	-.214	-.331	.837[a]					
SA1	-.095	.093	-.086	.057	-.042	.061	.900[a]				
SA2	.020	.009	.037	-.016	-.065	-.124	-.150	.935[a]			
SA3	-.022	-.027	.009	.043	-.023	-.127	-.270	-.073	.900[a]		
SA4	.083	.000	-.071	-.130	.004	.018	-.350	-.101	.091	.900[a]	
SA5	.007	-.008	.049	.030	-.014	.028	-.091	-.020	-.243	-.022	.921[a]
SA6	-.016	.035	-.074	.056	-.083	.009	-.035	-.024	-.224	-.165	-.107
SA7	.059	-.051	.056	-.042	.016	.016	-.074	-.067	-.126	-.094	-.272
SA8	-.010	-.003	.007	-.089	.004	-.009	-.022	-.060	-.158	-.123	-.201
SE1	-.043	-.034	-.048	-.024	.051	-.088	.003	.077	.021	-.103	-.080
SE2	-.022	.043	.025	.085	.001	.030	.024	-.021	-.075	-.006	.094
SE3	-.078	-.096	.146	.093	-.058	.006	-.013	.008	.010	-.073	.009
SE4	-.050	-.039	.061	-.010	-.050	-.006	-.034	.065	-.001	.007	-.002
SE5	.061	-.039	.061	-.058	.050	-.022	-.100	-.025	.011	.041	.070
MO1	.236	-.057	.051	-.001	-.008	.063	-.099	.023	.014	.054	.028
MO2	.030	-.095	.065	-.020	.050	-.003	.003	-.050	.036	.016	-.030
MO3	-.008	.057	.000	-.030	.047	.059	.048	-.003	-.117	-.012	.008
MO4	-.028	.015	-.076	-.010	-.065	.014	.074	-.089	-.031	-.040	-.037
MO5	.007	.033	-.093	.044	-.100	-.027	-.043	.051	.120	.036	-
MO6	-.014	.065	-.028	.031	-.068	.061	-.024	.101	-.043	.023	.030
MO7	-.144	.058	-.026	-.046	.033	.012	.017	.083	-.021	-.068	-.084
MO8	-.050	.010	.020	-.004	.061	-.057	-.010	-.010	-.024	-.024	.087
UT1	-.044	.033	.002	-.035	.010	-.004	-.008	.032	-.089	.074	.013
UT2	-.066	.016	-.021	.001	.020	.043	.049	-.088	-.037	-.006	-.010
UT3	-.004	-.006	.033	.018	.082	.004	.026	-.064	.021	-.073	-.019
UT4	.101	.003	-.079	-.021	-.043	-.073	-.067	.036	.148	.003	-.067
UT5	.099	-.022	.002	.062	-.040	-.010	.040	.026	.039	-.007	-.001
UT6	.111	-.073	.015	-.060	-.065	.050	-.002	-.061	-.010	-.005	-.026
UT7	-.047	-.006	-.018	.058	-.022	-.069	.012	-.014	.073	-.057	-.035
II1	.077	-.002	-.039	.097	-.064	-.085	-.026	-.038	.035	-.014	-.041
II2	-.204	.022	-.002	-.009	.116	.003	.023	-.051	.044	-.118	-.008
II3	-.060	.074	-.034	.015	.082	-.024	.057	-.041	-.112	-.034	.066
II4	.202	-.021	-.013	-.042	-.032	-.019	.001	-.037	-.049	.091	.013
II5	.065	.002	-.073	-.014	-.114	.089	-.068	-.050	.111	.085	-.014
II6	-.117	-.023	.088	-.043	-.022	.063	.023	-.011	-.043	.040	-.101
II7	.062	-.064	.090	.019	-.071	-.023	.000	.137	.022	-.029	-.072
II8	-.034	.055	-.103	-.039	-.047	.012	-.003	-.004	.055	.030	.122
PP	-.005	.000	.044	.099	-.138	.044	.042	.014	.025	-.038	.011

Anti-image Correlation (Continued)

	SA6	SA7	SA8	SE1	SE2	SE3	SE4	SE5	MO1	MO2
SA6	.916[a]									
SA7	-.170	.928[a]								
SA8	-.221	-.134	.940[a]							
SE1	.057	-.042	.061	.626[a]						
SE2	.000	.058	-.063	-.573	.659[a]					
SE3	.049	.053	-.050	.005	.178	.718[a]				
SE4	-.012	.033	-.003	.017	-.229	.276	.742[a]			
SE5	-.060	.029	.011	-.075	-.128	.103	-.237	.771[a]		
MO1	-.077	.091	.004	.041	-.069	-.004	-.050	.019	.846[a]	
MO2	.021	.005	-.043	.063	-.048	-.007	.035	-.003	-.053	.873[a]
MO3	.039	.032	-.022	-.083	.044	.038	.089	.047	-.121	.104
MO4	.112	-.026	.002	.033	-.041	-.010	-.020	-.028	-.056	-.395
MO5	-.104	-.070	.058	-.009	-.004	-.001	.003	-.052	.062	-.245
MO6	-.066	.044	-.013	-.084	.046	.005	-.081	.065	.025	-.358
MO7	.016	.003	.058	-.003	.063	-.010	-.047	-.022	-.344	-.188
MO8	.030	-.060	.014	.010	.064	-.048	-.031	-.019	-.134	-.359
UT1	-.089	-.035	.083	-.007	.081	.040	.042	-.062	.062	-.001
UT2	.091	.043	-.030	-.008	.005	.074	.034	-.019	.025	.041
UT3	-.004	.102	-.055	.028	-.025	-.040	-.099	.082	-.014	.050
UT4	.086	-.073	-.062	.023	-.081	.020	-.044	.024	.121	.013
UT5	-.013	-.017	-.030	-.022	-.094	-.120	-.026	.057	-.110	.009
UT6	-.050	.093	.031	.001	-.017	-.084	-.066	.069	.032	-.077
UT7	.112	-.028	-.100	.042	-.054	.026	.042	-.023	-.034	-.002
II1	.070	.011	-.005	.031	-.060	-.025	-.004	.051	-.014	.022
II2	.000	-.020	.008	.010	.011	.116	.005	.042	.083	.012
II3	.031	-.045	-.044	-.103	.074	-.104	-.014	.019	.082	-.009
II4	.005	.016	.007	.025	-.016	-.156	-.033	-.046	-.185	.007
II5	.008	.072	-.039	.002	-.025	-.055	.002	-.050	.066	.068
II6	.007	.088	.023	-.082	.018	.057	.053	.004	.011	-.036
II7	-.049	-.025	.010	.086	-.044	.075	.027	.004	-.105	-.029
II8	-.039	-.102	-.001	.007	-.020	.030	-.001	-.002	.021	-.050
PP	.099	-.030	-.070	.056	-.066	.078	.091	-.025	.000	.004

Anti-image Correlation (Continued)

	MO3	MO4	MO5	MO6	MO7	MO8	UT1	UT2	UT3	UT4	UT5
MO3	.910[a]										
MO4	-.168	.926[a]									
MO5	-.184	-.033	.912[a]								
MO6	-.273	-.131	.062	.901[a]							
MO7	-.089	.000	-.218	.139	.797[a]						
MO8	-.148	-.080	-.230	-.200	.165	.915[a]					
UT1	-.013	-.045	.079	.014	-.090	.003	.668[a]				
UT2	.150	.044	-.078	-.085	-.022	-.041	-.161	.707[a]			
UT3	.024	-.068	-.032	-.021	.029	.035	-.266	.050	.645[a]		
UT4	-.069	.034	.028	-.069	-.069	.009	-.238	-.032	-.027	.713[a]	
UT5	-.022	.057	-.036	.016	.064	-.040	-.581	-.119	-.036	.041	.721[a]
UT6	-.057	.017	.024	.060	.047	.001	-.374	-.085	.110	.033	.059
UT7	.020	.023	.005	-.033	.002	.015	-.335	.061	.113	-.001	-.028
II1	.001	-.028	.031	-.019	-.057	-.026	-.037	-.091	-.001	.005	.058
II2	.059	.026	.009	-.036	-.059	-.034	-.019	.065	-.015	.058	-.019
II3	.044	.041	-.061	-.001	.011	-.007	.024	.058	.035	.036	-.038
II4	-.091	.006	-.030	.014	.094	.054	.034	-.031	.042	-.059	-.010
II5	-.020	-.004	.036	-.038	-.017	-.058	-.068	.013	.003	.010	.042
II6	.053	-.062	-.055	.042	.024	.028	-.039	.059	.014	-.021	-.010
II7	-.073	-.042	.088	.063	-.001	.027	-.009	-.124	-.065	.004	.030
II8	.039	-.002	.017	.012	.001	-.007	.011	-.024	-.065	-.037	.045
PP	-.038	.021	-.042	.078	.013	-.027	-.005	-.025	-.004	-.036	-.024

Anti-image Correlation (Continued)

	UT6	UT7	II1	II2	II3	II4	II5	II6	II7	II8	PP
UT6	.704[a]										
UT7	.080	.718[a]									
II1	.074	.062	.915[a]								
II2	-.015	-.059	-.141	.731[a]							
II3	-.097	-.066	-.166	-.256	.813[a]						
II4	.004	.054	.023	-.854	.190	.717[a]					
II5	.092	.067	-.027	-.074	-.281	.043	.879[a]				
II6	.037	.080	-.107	-.117	.037	-.014	-.095	.891[a]			
II7	.049	.017	-.014	.167	-.556	-.217	-.260	-.074	.816[a]		
II8	-.028	-.104	-.135	-.019	-.006	-.075	-.103	-.093	-.044	.898[a]	
PP	-.009	.065	.089	-.053	-.064	.019	-.031	-.052	.012	.092	.509[a]

Appendix E: Rotated Component Matrix

Rotated Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
SP1						.760		
SP2						.852		
SP3						.822		
CE1							.787	
CE2							.786	
CE3							.727	
SA1		.814						
SA2		.595						
SA3		.850						
SA4		.753						
SA5		.840						
SA6		.834						
SA7		.825						
SA8		.822						
SE1					.695			
SE2					.823			
SE3					-.661			
SE4					.717			
SE5					.647			
MO1	.662							
MO2	.937							
MO3	.837							
MO4	.892							
MO5	.851							
MO6	.879							
MO7	.573							
MO8	.907							
UT1				.903				
UT2				.527				
UT3				.441				
UT4				.475				
UT5				.813				
UT6				.568				
UT7				.551				
II1			.703					
II2			.843					

Rotated Component Matrix (Continued)

	1	2	3	4	5	6	7	8
II3			.791					
II4			.800					
II5			.766					
II6			.607					
II7			.775					
II8			.589					
PP								.824

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Appendix F: Total Variance Explained

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.618	15.391	15.391	6.618	15.391	15.391	5.537	12.876	12.876
2	5.536	12.873	28.264	5.536	12.873	28.264	5.391	12.536	25.412
3	3.933	9.146	37.411	3.933	9.146	37.411	4.515	10.501	35.913
4	2.767	6.436	43.847	2.767	6.436	43.847	2.877	6.691	42.604
5	2.554	5.939	49.786	2.554	5.939	49.786	2.624	6.103	48.707
6	2.192	5.099	54.885	2.192	5.099	54.885	2.221	5.166	53.873
7	1.658	3.856	58.740	1.658	3.856	58.740	2.073	4.820	58.693
8	1.092	2.540	61.280	1.092	2.540	61.280	1.113	2.587	61.280
9	.975	2.268	63.549						
10	.954	2.218	65.767						
11	.926	2.154	67.921						
12	.925	2.151	70.072						
13	.869	2.022	72.093						
14	.829	1.929	74.022						
15	.816	1.898	75.920						
16	.758	1.763	77.683						
17	.691	1.607	79.290						
18	.677	1.574	80.863						
19	.639	1.486	82.350						
20	.584	1.359	83.708						
21	.570	1.326	85.034						
22	.533	1.240	86.275						
23	.502	1.167	87.442						
24	.475	1.104	88.546						
25	.435	1.012	89.559						
26	.426	.991	90.550						
27	.380	.884	91.434						
28	.362	.843	92.277						
29	.348	.808	93.085						
30	.314	.730	93.815						
31	.299	.696	94.511						
32	.296	.689	95.200						
33	.278	.647	95.847						

Total Variance Explained (Continued)

Component		Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
	34	.263	.612	96.459						
	35	.249	.579	97.038						
	36	.242	.562	97.599						
	37	.210	.488	98.087						
	38	.194	.451	98.538						
	39	.168	.391	98.930						
	40	.159	.371	99.300						
	41	.145	.338	99.638						
	42	.090	.209	99.847						
	43	.066	.153	100.000						

Extraction Method: Principal Component Analysis.

Appendix G: Medium to High Risk Research Ethics Approval Checklist

1. Project Information (Everyone)

Title of Project **Factors that affect Learners' performance in Web-based courses: The case of the Accounting courses at the Hashemite University**
Name of Principal Investigator (PI) or Research or Professional Degree Student **Abdullah H. H. Al-Hadrami**
Faculty, Department or Institute **Business, Environment and Society**
Names of Co-investigators (CIs) and their organisational affiliation **N/A**
How many additional research staff will be employed on the project **0 (none)** Names and their organisational affiliation (if known) **N/A**
Proposed project start date (At least three months in the future) **February 2010**
Estimated project end date **January 2011**
Who is funding the project? **Self funding** Has funding been confirmed?
Code of ethical practice and conduct most relevant to your project: **Coventry University**

Students Only

Degree being studied (MSc/MA by Research, MPhil, PhD, EngD, etc) **PhD**
Name of your Director of Studies **Prof. David Morris**
Date of Enrolment **22 January 2008**

2. Does this project need ethical approval?

Questions	Yes	No
Does the project involve collecting primary data from, or about, living human beings?	X	
Does the project involve analysing primary or unpublished data from, or about, living human beings?	X	
Does the project involve collecting or analysing primary or unpublished data about people who have recently died other than data that are already in the public domain?		X
Does the project involve collecting or analysing primary or unpublished data about or from organisations or agencies of any kind other than data that are already in the public domain?		X
Does the project involve research with non-human vertebrates in their natural settings or behavioural work involving invertebrate species not covered by the Animals Scientific Procedures Act (1986)?[1]		X
Does the project place the participants or the researchers in a dangerous environment, risk of physical harm, psychological or emotional distress?		X
Does the nature of the project place the participant or researchers in a situation where they are at risk of investigation by the police or security services?		X

If you answered **Yes** to **any** of these questions, proceed to **Section 3**.

If you answered **No** to **all** these questions:

- You **do not** need to submit your project for peer ethical review and ethical approval.
- You should sign the Declaration in **Section 16** and keep a copy for your own records.
- Students must ask their Director of Studies to countersign the declaration and they should send a copy for your file to the Registry Research Unit.

[1] The Animals Scientific Procedures Act (1986) was amended in 1993. As a result the common octopus (*Octopus vulgaris*), as an invertebrate species, is now covered by the act.

3. Does the project require Criminal Records Bureau checks?

Questions	Yes	No
Does the project involve direct contact by any member of the research team with children or young people under 18 years of age?		X
Does the project involve direct contact by any member of the research team with adults who have learning difficulties?		X
Does the project involve direct contact by any member of the research team with adults who are infirm or physically disabled?		X
Does the project involve direct contact by any member of the research team with adults who are resident in social care or medical establishments?		X
Does the project involve direct contact by any member of the research team with adults in the custody of the criminal justice system?		X
Has a Criminal Records Bureau (CRB) check been stipulated as a condition of access to any source of data required for the project?		X

If you answered **Yes** to **any** of these questions, please:

- Explain the nature of the contact required and the circumstances in which contact will be made during the project.

4. Is this project liable to scrutiny by external ethical review arrangements?

Questions	Yes	No
Has a favourable ethical opinion been given for this project by an external research ethics committee (e.g. social care, NHS or another University)?		X
Will this project be submitted for ethical approval to an external research ethics committee (e.g. social care, NHS or another University)?		X

**If required

If you answered **No** to **both** of these questions, please proceed to **Section 5**.

If you answered **Yes** to **either** of these questions:

- Sign the Declaration in **Section 16** and send a copy to the Registry Research Unit.
- Students must get their Director of Studies to countersign the checklist before submitting it.

5. More detail about the project

What are the aims and objectives of the project? The project aims to investigate factors that affect students' performance in web-based courses in Jordan.
Briefly describe the principal methods, the sources of data or evidence to be used and the number and type of research participants who will be recruited to the project. Three major sources of data will be used: • Published sources in the public domain • A questionnaire survey (approximately 200 respondents) • Key informant interviews (approximately 15 – 20 interviewees)
What research instrument(s), validated scales or methods will be used to collect data? A survey instrument (questionnaire). Interviews will be semi-structured.
If you are using an externally validated research instrument, technique or research method, please specify. N/A
If you are not using an externally validated scale or research method, please attach a copy of the research instrument you will use to collect data. For example, a measurement scale, questionnaire, interview schedule, observation protocol for ethnographic work or, in the case of unstructured data collection, a topic list. A copy of the proposed questionnaire is attached. A draft interview schedule is attached.

6. Confidentiality, security and retention of research data

Questions	Yes	No
Are there any reasons why you cannot guarantee the full security and confidentiality of any personal or confidential data collected for the project?		X
Is there a significant possibility that any of your participants, or people associated with them, could be directly or indirectly identified in the outputs from this project?		X
Is there a significant possibility that confidential information could be traced back to a specific organisation or agency as a result of the way you write up the results of the project?		X
Will any members of the project team retain any personal or confidential data at the end of the project, other than in fully anonymised form?		X
Will you or any member of the team intend to make use of any confidential information, knowledge, trade secrets obtained for any other purpose than this research project?		X

If you answered **No** to **all** of these questions:

- Explain how you will ensure the confidentiality and security of your research data, both during and after the project.

As this research is investigating factors that affect students' performance (final grade) in Accounting courses at the Hashemite University, the questionnaire asks for the student's ID so that the researcher can link each questionnaire to each respondent. In order to ensure the confidentiality and security of the research data and to protect the respondents' identities I confirm the following:

- No-one other than myself and the supervisory team will have access to the questionnaire data, this includes staff of the Hashemite University. Thus there will be no way in which data gathered from the questionnaire can be linked to individuals.
- The information linking performance to questionnaire data will be destroyed once the data had been collected and coded for analysis. This will be achieved by removing the ID data field from the questionnaires.
- The researcher confirms that he does not know the identity of any lecturer on the courses from which data is being collected, and that no lecturer can access any questionnaire data or part of it informally or formally
- The questionnaire will be distributed and collected without the presence of the course lecturer.
- Collected questionnaires will be placed in a sealed envelope in full view of the students.
- The researcher will code and analyse the data himself, no-one else will have access to the data at this stage.

It is possible that students may provide information that might be deemed critical of the teaching provided by accounting staff at the Hashemite University. No data or information resulting from the study will be provided to the university and the published thesis will be checked in order to ensure that there is no implied or actual criticism of staff teaching performance or style in the text.

The identities of individuals, departments, and participants will, where necessary, be made anonymous through pseudonyms; personal details will not disclosed to anyone else.. Interview data and transcripts, including observations reported beyond the researcher's initial notes, will also be fully anonymous; names and potentially identifying details will be removed and/or replaced with pseudonyms. Transcripts (and equivalent audio or visual data) will be stored securely in password-protected computer files or locked cabinets only accessible to the researcher.

Interviews will be conducted in a confidential and secure setting, or over private communication channels in the case of online correspondence.

Interviewees will be given the opportunity to read transcripts of their interviews before they are used for research purposes. They will be invited to offer clarifications and make changes. They will also be given the opportunity to withdraw themselves from the research at this stage.

If you answered **Yes** to **any** of these questions:

- Explain the reasons why it is essential to breach normal research protocol regarding confidentiality, security and retention of research data.

N/A

7. Informed

Questions	Yes	No
Will all participants be fully informed why the project is being conducted and what their participation will involve and will this information be given before the project begins?	X	
Will every participant be asked to give written consent to participating in the project before it begins?	X	
Will all participants be fully informed about what data will be collected and what will be done with these data during and after the project?	X	
Will explicit consent be sought for audio, video or photographic recording of participants?	X	
Will every participant understand what rights they have not to take part, and/or to withdraw themselves and their data from the project if they do take part?	X	
Will every participant understand that they do not need to give you reasons for deciding not to take part or to withdraw themselves and their data from the project and that there will be no repercussions as a result?	X	
If the project involves deceiving or covert observation of participants, will you debrief them at the earliest possible opportunity?	N/A	

If you answered **Yes** to **all** these questions:

- Explain briefly how you will implement the informed consent scheme described in your answers.
- Attach copies of your participant information leaflet, informed consent form and participant debriefing leaflet (if required) as evidence of your plans.

Interviewees will be invited to participate via a brief letter. Invitees will be given the opportunity to clarify any matters with the researcher prior to the interview.

At the outset of the interview the researcher will remind the interviewee of the confidentiality arrangements and ask if all matters are clear. The researcher will seek explicit consent to audio record the interview and take brief notes. The audio recording will commence with a verbal note that consent has been given to record.

Transcripts of interviews will be offered for edit and review prior to analysis, and participants will be informed of the right to withdraw from the project at any time without providing a reason.

If you answered **No** to **any** of these questions:

- Explain why it is essential for the project to be conducted in a way that will not allow all participants the opportunity to exercise fully-informed consent.
- Explain how you propose to address the ethical issues arising from the absence of transparency.
- Attach copies of your participant information sheet and consent form as evidence of your plans.

N/A

8. Risk of harm

Questions	Yes	No
Is there any significant risk that your project may lead to physical harm to participants or researchers?		**X**
Is there any significant risk that your project may lead to psychological or emotional distress to participants or researchers?		**X**
Is there any significant risk that your project may place the participants or the researchers in potentially dangerous situations or environments?		**X**
Is there any significant risk that your project may result in harm to the reputation of participants, researchers, their employers, or other persons or organisations?		**X**

If you answered **Yes** to **any** of these questions:

- Explain the nature of the risks involved and why it is necessary for the participants or researchers to be exposed to such risks.
- Explain how you propose to assess, manage and mitigate any risks to participants or researchers.
- Explain the arrangements by which you will ensure that participants understand and consent to these risks.
- Explain the arrangements you will make to refer participants or researchers to sources of help if they are seriously distressed or harmed as a result of taking part in the project.
- Explain the arrangements for recording and reporting any adverse consequences of the research.

N/A

9. Risk of disclosure of harm or potential harm

Questions	Yes	No
Is there a significant risk that the project will lead participants to disclose evidence of previous criminal offences or their intention to commit criminal offences?		X
Is there a significant risk that the project will lead participants to disclose evidence that children or vulnerable adults have or are being harmed or are at risk of harm?		X
Is there a significant risk that the project will lead participants to disclose evidence of serious risk of other types of harm?		X

If you answered **Yes** to **any** of these questions:

- Explain why it is necessary to take the risks of potential or actual disclosure.
- Explain what actions you would take if such disclosures were to occur.
- Explain what advice you will take and from whom before taking these actions.
- Explain what information you will give participants about the possible consequences of disclosing information about criminal or serious risk of harm.

N/A

10. Payment of participants

Questions	Yes	No
Do you intend to offer participants cash payments or any other kind of inducements or compensation for taking part in your project?		X
Is there any significant possibility that such inducements will cause participants to consent to risks that they might not otherwise find acceptable?		X
Is there any significant possibility that the prospect of payment or other rewards will systematically skew the data provided by participants in any way?		X
Will you inform participants that accepting compensation or inducements does not negate their right to withdraw from the project?		X

If you answered **Yes** to **any** of these questions:

- Explain the nature of the inducements or the amount of the payments that will be offered.
- Explain the reasons why it is necessary to offer payments.
- Explain why you consider it is ethically and methodologically acceptable to offer payments.

N/A

11. Capacity to give informed consent

Questions	Yes	No
Do you propose to recruit any participants who are under 18 years of age?		X
Do you propose to recruit any participants who have learning difficulties?		X
Do you propose to recruit any participants with communication difficulties including difficulties arising from limited facility with the English language?		X
Do you propose to recruit any participants who are very elderly or infirm?		X
Do you propose to recruit any participants with mental health problems or other medical problems that may impair their cognitive abilities?		X
Do you propose to recruit any participants who may not be able to understand fully the nature of the research and the implications for them of participating in it?		X

If you answered **Yes** to **only the last two** questions, proceed to **Section 16** and then apply using the online NHS Research Ethics Committee approval form.

If you answered **Yes** to **any** of the **first four** questions:

- Explain how you will ensure that the interests and wishes of participants are understood and taken in to account.
- Explain how in the case of children the wishes of their parents or guardians are understood and taken into account.

N/A

12. Is participation genuinely voluntary?

Questions	Yes	No
Are you proposing to recruit participants who are employees or students of Coventry University or of organisation(s) that are formal collaborators in the project?	X	
Are you proposing to recruit participants who are employees recruited through other business, voluntary or public sector organisations?		X
Are you proposing to recruit participants who are pupils or students recruited through educational institutions?	X	
Are you proposing to recruit participants who are clients recruited through voluntary or public services?		X
Are you proposing to recruit participants who are living in residential communities or institutions?		X
Are you proposing to recruit participants who are in-patients in a hospital or other medical establishment?		X
Are you proposing to recruit participants who are recruited by virtue of their employment in the police or armed services?		X
Are you proposing to recruit participants who are being detained or sanctioned in the criminal justice system?		X
Are you proposing to recruit participants who may not feel empowered to refuse to participate in the research?		X

If you answered **Yes** to **any** of these questions:

- Explain how your participants will be recruited.
- Explain what steps you will take to ensure that participation in this project is genuinely voluntary.

The researcher is a lecturer in the Department of Accounting at the University College of Bahrain where the research is based. The questionnaire respondents are students in the researcher's former department at the Hashemite University. The researcher is no longer responsible for, or teaches any of, the students who will be invited to respond to the questionnaire. It is possible that some students participating in the research may have been taught by the researcher in the past, but this is highly unlikely. It will be made clear to students that participation in the research is entirely voluntary and anonymous and will have no bearing on any student's standing with the Hashemite University other than through public publication of the final research.

A letter of agreement from the Hashemite University is attached.

13. On-line and Internet Research

Questions	**Yes**	**No**
Will any part of your project involve collecting data by means of electronic media such as the Internet or e-mail?		**X**
Is there a significant possibility that the project will encourage children under 18 to access inappropriate websites or correspond with people who pose risk of harm?		**X**
Is there a significant possibility that the project will cause participants to become distressed or harmed in ways that may not be apparent to the researcher(s)?		**X**
Will the project incur risks of breaching participant confidentiality and anonymity that arise specifically from the use of electronic media?		**X**

If you answered **Yes** to **any** of these questions:

- Explain why you propose to use electronic media.
- Explain how you propose to address the risks associated with online/internet research.
- Ensure that your answers to the previous sections address any issues related to online research.

N/A

14. Other ethical risks

Question	**Yes**	**No**
Are there any other ethical issues or risks of harm raised by your project that have not been covered by previous questions?		**X**

If you answered **Yes** to **this** question:

- Explain the nature of these ethical issues and risks.
- Explain why you need to incur these ethical issues and risks.
- Explain how you propose to deal with these ethical issues and risks.

N/A

15. Research with non-human vertebrates[2]

Questions	Yes	No
Will any part of your project involve the study of animals in their natural habitat?		X
Will your project involve the recording of behaviour of animals in a non-natural setting that is outside the control of the researcher?		X
Will your field work involve any direct intervention other than recording the behaviour of the animals available for observation?		X
Is the species you plan to research endangered, locally rare or part of a sensitive ecosystem protected by legislation?		X
Is there any significant possibility that the welfare of the target species or those sharing the local environment/habitat will be detrimentally affected?		X
Is there any significant possibility that the habitat of the animals will be damaged by the project such that their health and survival will be endangered?		X
Will project work involve intervention work in a non-natural setting in relation to invertebrate species other than *Octopus vulgaris*?		X

If you answered **Yes** to **any** of these questions:

- Explain the reasons for conducting the project in the way you propose and the academic benefits that will flow from it.
- Explain the nature of the risks to the animals and their habitat.
- Explain how you propose to assess, manage and mitigate these risks.

N/A

[2] The Animals Scientific Procedures Act (1986) was amended in 1993. As a result the common octopus (*Octopus vulgaris*), as an invertebrate species, is now covered by the act.

16. Principal Investigator Certification

Please ensure that you:

- Tick all the boxes below that are relevant to your project and sign this checklist.
- Students must get their Director of Studies to countersign this declaration.

I believe that this project **does not require research ethics peer review**. I have completed Sections 1-2 and kept a copy for my own records. I realise I may be asked to provide a copy of this checklist at any time.	
I request that this project is **exempt from internal research ethics peer review** because it will be, or has been, reviewed by an external research ethics committee. I have completed Sections 1-4 and have attached/will attach a copy of the favourable ethical review issued by the external research ethics committee. Please give the name of the external research ethics committee here: Send to ethics.uni@coventry.ac.uk	
I **request an ethics peer review** and confirm that I have answered all relevant questions in this checklist honestly. Send to ethics.uni@coventry.ac.uk	X
I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request new ethical approval if the project subsequently changes the information I have given in this checklist.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the Code of Research Ethics issued by the relevant national learned society.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the University's Research Ethics, Governance and Integrity Framework.	X

Signatures

If you submit this checklist and any attachments by e-mail, you should type your name in the signature space. An email attachment sent from your University inbox will be assumed to have been signed electronically.

Principal Investigator

Signed Abdullah H.AL-Hadrami .... (Principal Investigator or Student)

Date 4 January 2010

Students submitting this checklist by email must append to it an email from their Director of Studies confirming that they are prepared to make the declaration above and to countersign this checklist. This email will be taken as an electronic countersignature.

Student's Director of Studies

Countersigned [redacted] .... (Director of Studies)

Date 4 January 2010

I have read this checklist and confirm that it covers all the ethical issues raised by this project fully and frankly. I also confirm that these issues have been discussed with the student and will continue to be reviewed in the course of supervision.

Note: This checklist is based on an ethics approval form produce by Research Office of the College of Business, Law and Social Sciences at Nottingham Trent University. Copyright is acknowledged.

Participant information sheet

What is the purpose of this study?
The project aims to explore factors that affect the students' performance in web-based courses in Jordan**.**

This study is the focus of a PhD research programme being undertaken at Coventry University, UK. My Director of Studies is Professor David Morris.

What do I have to do?
I am collecting data in two main ways. Firstly I am using a questionnaire to gather some preliminary information on views and opinions of accounting students.

I need you to fill in your student ID number on the questionnaire because the aim of the research is to explore the links between student backgrounds and performance on the course. I will ensure that all data is only used for my research and will be destroyed once the research is completed. No data you provide me with will be disclosed to the Hashemite University or any of its staff.

Secondly I will ask some people to help me by being interviewed. Interviews will normally last for less than one hour and will take place at a time and location to suit the interviewee. I will let all interviewees have some notes outlining areas where I would like to ask questions before the interview is scheduled to take place. I will be conducting all interviews personally.

The data gathered from interviews is a vital component of my research. In order to make full use of it I will need to record interviews wherever possible. Recordings may subsequently be transcribed for fuller analysis.

What if I change my mind?
Your participation in this study is voluntary and you are free to withdraw from the project at any time during its course. It is not necessary to provide a reason for doing so (although feedback is always appreciated). If you are uncomfortable with any aspect of the research then please inform the researcher.

Data (e.g. recordings, interview transcripts) may be withdrawn at your discretion during the course of the research period.

What will happen to the information I give?
Data will be stored securely and reviewed by the researcher only. None of the information you give, notes taken, or recordings will be used outside of the project without your permission, and no-one outside of me

and my supervisory team will have access to the data. Details that would lead others to be able to identify you (such as your name, student ID or particularly detailed information about your university work) will not be released in either my thesis or publications.

What will happen to the results of this study?

The results of this study are intended primarily for publication as a PhD thesis. They may also be used for other publications (such as journal articles) or in presentations within the framework set out in this information sheet. You may also wish to view the results of the study at the completion of the PhD thesis, if this is the case then please contact me.

Who should I contact if I have any queries?

Should you have any questions about the research, please contact **Abdullah H. Al-Hadrami hadramia@coventry.ac.uk**.

Making a Complaint

If you take part and are unhappy with any aspect of this research then you should contact my Director of Studies

Professor David Morris
d.morris@coventry.ac.uk

in the first instance. If you still have concerns and wish to make a formal complaint about the conduct of the research then you should write to:

Professor Ian M Marshall
Pro-Vice-Chancellor (Research)
Coventry University
Priory Street
Coventry
CV1 5FB

In your letter please provide as much detail about the research as possible, the name of the Researcher and indicate in detail the nature of your complaint.